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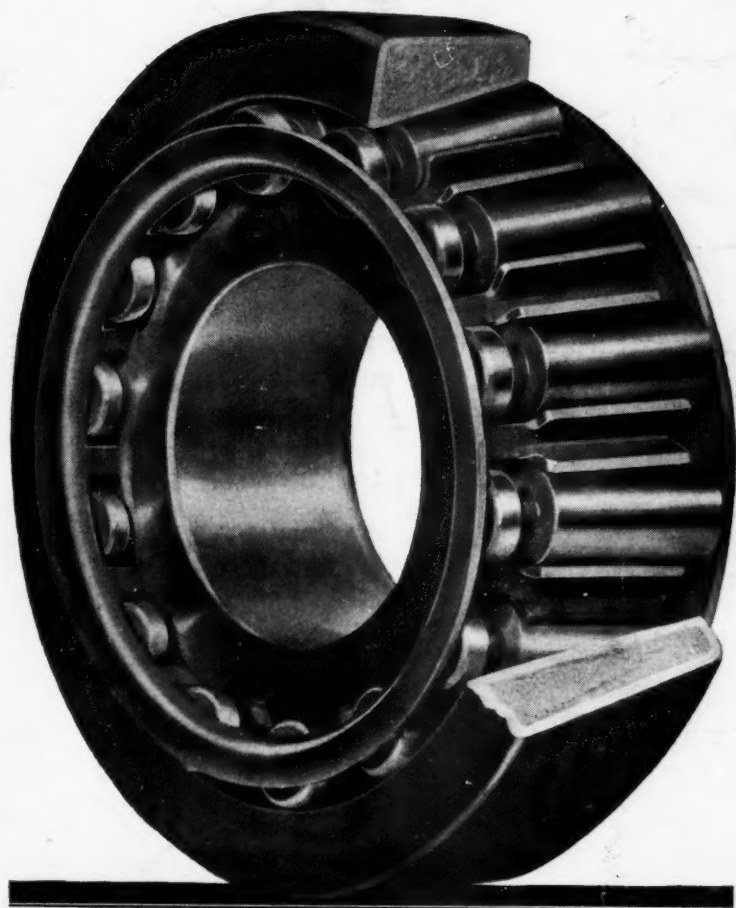
AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

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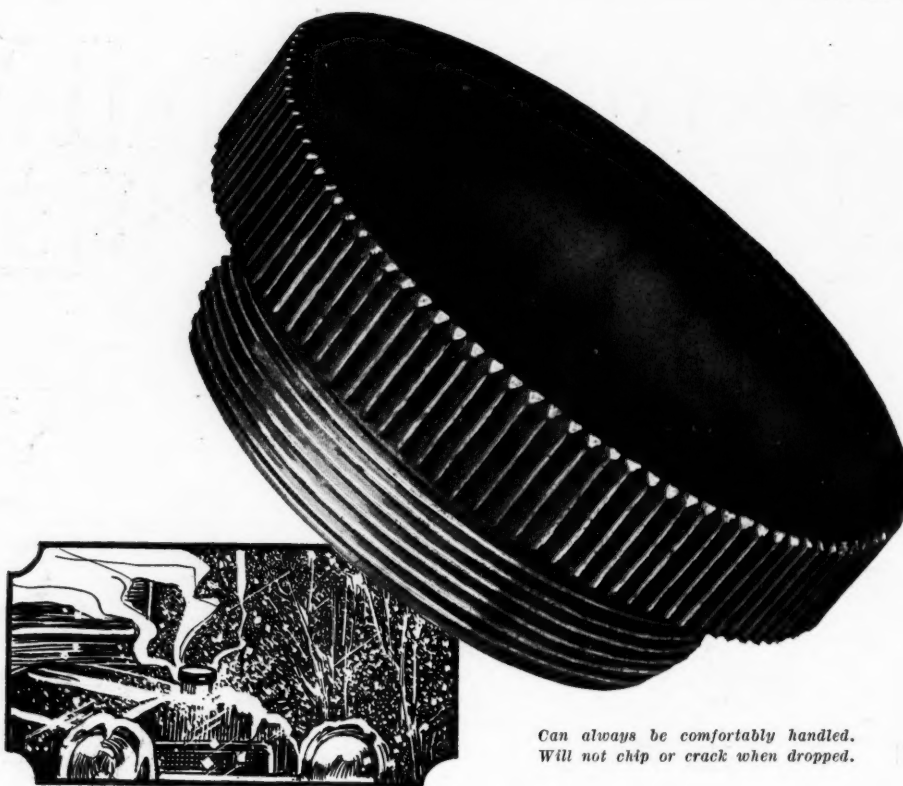
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NEW YORK—THURSDAY, JANUARY 27, 1921

No. 4

Cost Accounting as a Basis for Selling Cars

On the competitive market that is before the vehicle manufacturer, the car that supplies the best value for the money will win. It behooves the maker to know the cost, in order to intelligently meet competition. This article explains one method.

By Clyde Jennings

HOW much does the vehicle you are building cost?

How much does each part cost?

Are you building these parts cheaper than you could buy them?

Is your direct charge for direct labor, indirect labor, factory maintenance or sales too high?

Can you discuss these items with your neighbor and if you do, will you use the same words with the same meaning?

These are a few questions that were suggested at a recent meeting of the Industrial Cost Association. The object of this meeting was to organize in New York a section of the association. The section was organized and will hold monthly meetings. At these meetings the members have promised that they will sit around the table and discuss costs. First, they will establish definitions for the various terms so that they can understand each other.

The men gathered at this meeting were very frank about present conditions. They freely admitted that following the free sales period of the past few years they were now confronting a falling market. Cost has gained a greater importance than ever before.

Competition is certain to be sharp and many factories will need to know exactly where the high spots in the cost are. They will need to get down to bed rock so that they can sell as low as possible and yet not lose money. They will also need to analyze their costs and compare them with other factories doing similar work to be sure that these costs are within reason.

To do this, it is necessary to have a recognized terminology, so that the confrères may speak the same language.

Prof. W. Rautenstrauch of Columbia University, who also is a practical and active manufacturer, talked for some time on this line of thought. He said that in his work he often felt the need of discussing the cost of "tools per man" with factory managers who are doing a similar work to that done in his factory. This need not mean a similar product, but working with similar materials. In such cases most of the time of the discussion is apt to be taken up with reaching an understanding as to how depreciation is charged off and what items are included in certain other charges.

The speaker cited the advance made in the study of chemistry since all chemists spoke the same lan-

guage and used the same measurements. He also cited the recent accomplishments of the astronomers in measuring the star Betelgeuse with its hundreds of millions of miles in computations. The thing that we need to do now, he said, is to establish standards whereby we can accurately measure some of the factors in our everyday affairs.

The story of the organization of this Association is interesting. A. A. Alles, Jr., as a member of the cost committee of the American Gear Makers' Association, attempted to gather material for a paper to read before that body. He wrote to practically all of the industrial associations and to many large manufacturers for assistance, but the replies that came back were requests for assistance from him. He found that while many industrial associations had attempted to establish systems, most of them had not been able to make much progress, because they had confined themselves to the distribution of forms rather than to the extension of their work to explain why such a system was recommended. One or two associations had made definite progress, but they had confined their work exclusively to their lines of business and had not really attempted a solution of the great fundamental problems.

It occurred to Alles while working with this problem that cost accounting education should not be limited to a definite industry, but that its fundamentals should be the same for all industry. As a result of this correspondence it became apparent that there is great need of co-operation on the part of practical business men in seeking a solution of this question. So this organization was formed by representatives of firms who asked permission to co-operate in the dissemination of this information. This movement, Alles explained in telling the story to the New York section, is entirely apart from any similarly named movement on the part of professional accountants. Regardless of the merits of accounting systems, this body of men are looking at the problem differently. They have nothing to sell and they will get benefit only as they join in the mutual understanding and practices of other manufacturers, so that they can discuss costs with their neighbors. Any direct value will have to come to them through the elimination of that competition which is founded on a lack of understanding. The membership in the association does not bind the firm or trade association to an adoption of the methods suggested.

The prospectus of the Association says, "It is not a matter of regulating costs or prices. That would be contrary to public policy." This prospectus says the objects of the association are:

(a) To stimulate the interest of all manufacturers in correctly determined costs.

(b) To standardize cost and accounting terminology; to establish governing principles; and to simplify cost accounting.

(c) To educate our members in the use and advantages of graphic charts and other modern methods of cost analysis and control.

(d) To assist members of the Association who are identified with cost committees of trade organizations in formulating uniform cost methods, and to recommend to our members the adoption of such uniform methods.

(e) To provide a forum for the discussion of cost problems and practices through general and local meetings; and to gather and disseminate news of interest to our members.

(f) To establish a library of cost literature, and to maintain a bureau of information through which members may be assisted in the solution of their individual cost problems.

(g) To co-ordinate the efforts of our members to the end that cost production may be considered in its proper relation to the complex problems of industrial management.

The method of carrying out these objects is simple. It is the intent to arrange the national membership into groups and that these men shall meet and discuss definite topics. One evening might be devoted to "direct labor." Another to what it is proper to charge to the sales department. A transcript will be made of these discussions. They will be sent to the central body committees and there digested. It is hoped in this way to finally arrive at a satisfactory definition of the terms that now figure in costs and which are now so variable.

One of the speakers at the recent New York section meeting was C. H. Smith, who is in charge of clerical work for the Westinghouse Air Brake Co. He said that his company had joined this association because it had been unable to solve its own problems and wanted assistance from all sources. He said that when the effort was first made to learn what were the costs of manufacture of that company's products, only confusion resulted. Each of the factories had its own method of figuring cost and the gathering of data on labor, sales and other items were useless because they could not be compared. Patient effort had brought some order out of this confusion, but the desired results were still far in the future. Smith told an interesting story of a recent conference on this subject, at which one of the confrères was a professor of cost accounting for a correspondence school. This man said that the proper method of charging overtime was to divide it equally between the factory maintenance charge and the sales charge. His reason for placing the charge against the sales department was that if the sales department had not sold the goods, the overtime would not be incurred.

All through these talks was a running comment on the difficulties that manufacturers have recently experienced in solving the questions of federal taxes and of the estimating of depreciation to obtain the proper credits in making tax returns. The present confusion, it was maintained, is due to the fact that there is no existing standard or understanding which the government can adopt for the making of these returns. Such an understanding, it was asserted, would have saved the manufacturers a great deal of expense and confusion.

The membership of this Association is quite large, considering that it is less than a year old. The roster of firms and trade associations is an imposing one. It apparently does not include any automobile manufacturer, but it does include many parts manufacturers.

The lesson for the automotive industry that is to be drawn out of the work would seem to be this:

The selling of automotive vehicles is to be strictly competitive for some time in the future. In the end, the man who gives the best value for the money will win. The best method of making sure to give the best value for the money is to know exactly the cost.

Profitable selling, of course, means getting back the cost with a reasonable profit. So cost must become the basis of selling. Cost can be separated into its several elements and the manufacturer who cannot meet the prices of his competitors can then pick out the points of excessive cost. Without adequate cost data, the manufacturer does not know where to cut, for he does not know in what regard his costs are too high.

A. A. Alles, Jr., 1501 Peoples Bank Building, Pittsburgh, is executive secretary of the Association. F. G. Roberts of SKF Industries, 165 Broadway, is secretary of the New York section.

Friction Metal for Brake Linings

An adaptation of European practice facilitated by manufacture in this country of a copper-lead alloy said to possess exceptional friction qualities. Tests with V-shape brake on truck promise well. Elimination of brake squeaking said to be effected. High friction coefficient claimed.

IN the United States and Great Britain it is now the almost universal practice to line motor car brakes with a woven friction lining of asbestos, cotton, rubber and wire. In Continental Europe, on the other hand, metal to metal brakes are extensively used, and, of course, all railroad braking is by metal to metal brakes. One objection to metal brakes for motor car work in the past has been that such brakes lose a great deal in holding ability when oil gets onto their braking surfaces. It is quite possible that with improved methods for packing the axles, so as to prevent the escape of oil from them, this objection is no longer valid.

The Super-Refined Metals Co., manufacturers of the well-known Kelly metal for bearings, have developed a copper-lead alloy called Kelmet which has exceptional friction qualities and which they plan to market as a brake metal. It was found that lining an ordinary brake shoe or sector having a flat cylindrical friction surface with the metal, did not work out to the best advantage, as the brake then was too harsh in action. Consequently a brake with V-section surface was designed, and this is said to have overcome the harshness.

The manufacturer of this metal made some tests with these brakes on a Mack truck at Los Angeles. These tests attracted the attention of the International Motor Co., manufacturers of the Mack truck, and at their invitation officials of the metals company came to New York recently and had a set of their brakes fitted to a Mack 5½-ton truck with which braking tests were made. The total weight of truck and load was 21,845 lb. The first test was made on a hard surfaced road in New York City which is mainly used for trucking purposes in unloading ships. The road consists mostly of sand and gravel but has a substantial foundation and is very good. The results of these trials were as follows:

Speed, M.P.H.	Distance,* Ft.	Time, Sec.
15	23 2/3	2 1/5
14	17	1 4/5

*Traveled after brake was applied.

The second test was made on Fort George Hill, which has a roadbed of stone blocks and a grade of 12 per cent. The results of this test were as follows:

Speed, M.P.H.	Distance, Ft.	Time, Sec.
20	96 1/6	5 2/5
20	86 1/4	4 3/5

These tests were under the supervision of the Mack

company testers and several officers of the Super-Refined Metals Co., including G. H. Beaton, president; F. C. Harding, vice-president, and H. A. Walker, who devised the method of application of the Kelly metal with the V-type of brake.

The Mack company on Oct. 26 held a similar test with the same truck equipped with its standard fabric lined brakes. The results of these tests on the level roads were as follows:

Speed, M.P.H.	Distance, Ft.
12	20 11/12
12	20 11/12
12	20 1/4

The tester then made a first adjustment of the brakes, after which he made two more trials as follows:

Speed, M.P.H.	Distance, Ft.
12	32 1/4
12	24 1/4

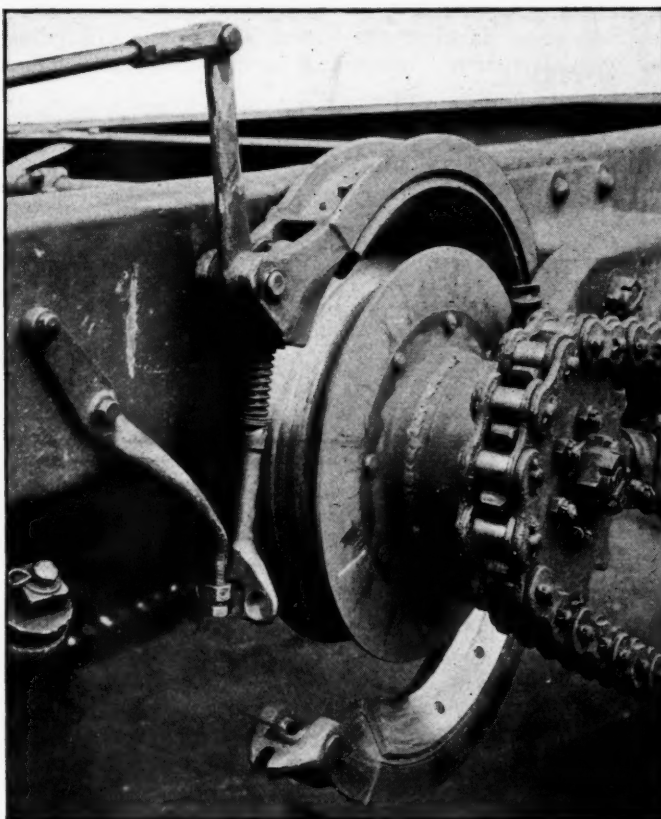
On the Fort George Hill only one trial was made, with the following results:

Speed, M.P.H.	Distance, Ft.
15	56 1/3

Reducing all the tests held under the same conditions to a common basis of 12 m.p.h., the average stopping distance on the level with Kelmet brakes was 13 5/16 ft., and with fabric brakes 24 1/2 ft.

Reducing the Fort George Hill results to a basis of 15 m.p.h., the truck with the Kelmet brakes stopped in 56 2/3 ft. and the truck with the fabric brakes in 51 1/4 ft. These test results therefore do not appear very consistent, for while in the tests on the level the truck was stopped with Kelmet brakes in little over half the distance as with fabric brakes, on the 12 per cent down grade the relative distance covered before coming to a stop was only slightly less than with the fabric brakes.

The alloy used for brake lining has a melting temperature of 1650 deg. Fahr. and is claimed to have a friction coefficient roughly 22 per cent greater than asbestos fabric.



V-type brake with metallic friction surface applied to Mack truck

New Wright Aeronautic Engine Succeeds the Hispano-Suiza

New job resembles predecessor in many detail parts, retaining steel sleeve and combination valve stem and tappet, but embodies many changes originally developed by Wright company, including better cooling and simplified lubrication systems. New magneto mounting provided.

By A. Ludlow Clayden

THE Wright Aeronautical Corp., the successor of Wright-Martin Aircraft Co., who manufactured Hispano-Suiza motors in large quantities during the war, have just produced a new engine which will be known as the Wright model E-2, this marking the abandonment of the connection with Hispano. While the new engine embodies many features which are similar to Hispano practice there is scarcely a detail that is not an original development of the Wright Aeronautical company's engineering work. In fact the new model resembles the original Hispano only to about the same extent as the Liberty engine resembled the original Mercedes.

There are two typical Hispano features retained, namely, the cylinder construction, which consists of steel sleeves threaded into a common aluminum water jacket, and the well known combination valve tappet and valve stem. Even in these parts there are changes, notably in the heads of the steel cylinders, which are very much thicker, a change which has been found to do away almost entirely with valve warping. Probably the thick cylinder head remains actually cooler in operation than a thin head, in just the same way that a thick piston head has been found to enable a piston to run cooler.

Better valve cooling has been still further insured by

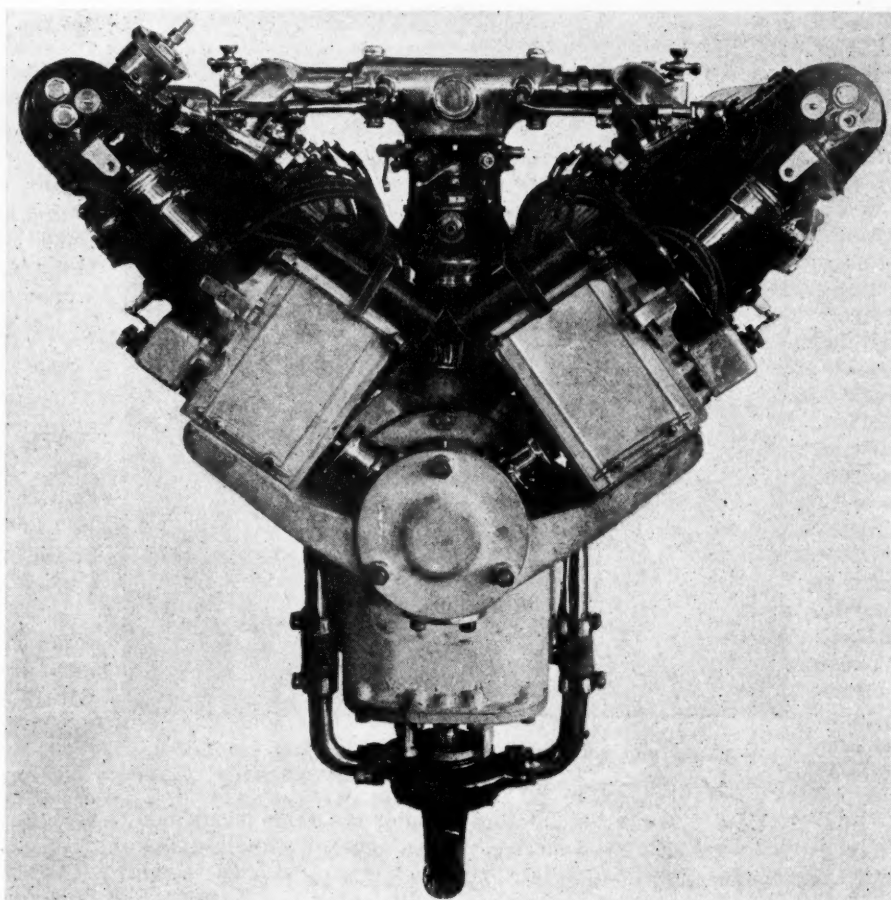
altering the shape of the exhaust valve ports. These are oval in normal section, giving a large area with but small depth, so that there is plenty of room for water beneath the ports and above the cylinder heads. Tests on the block and in the air indicate that the valve life has been at least doubled as compared with the Hispano original design.

A deeper water jacket is used, coming low enough to cover all the piston rings at the bottom end of the stroke. This provides enough extra piston cooling to allow a slight increase in compression with corresponding increase in power. The change in compression is not great but just enough to be perceptible, the depth of the combustion space having been decreased by 5 mm. by the thicker cylinder heads.

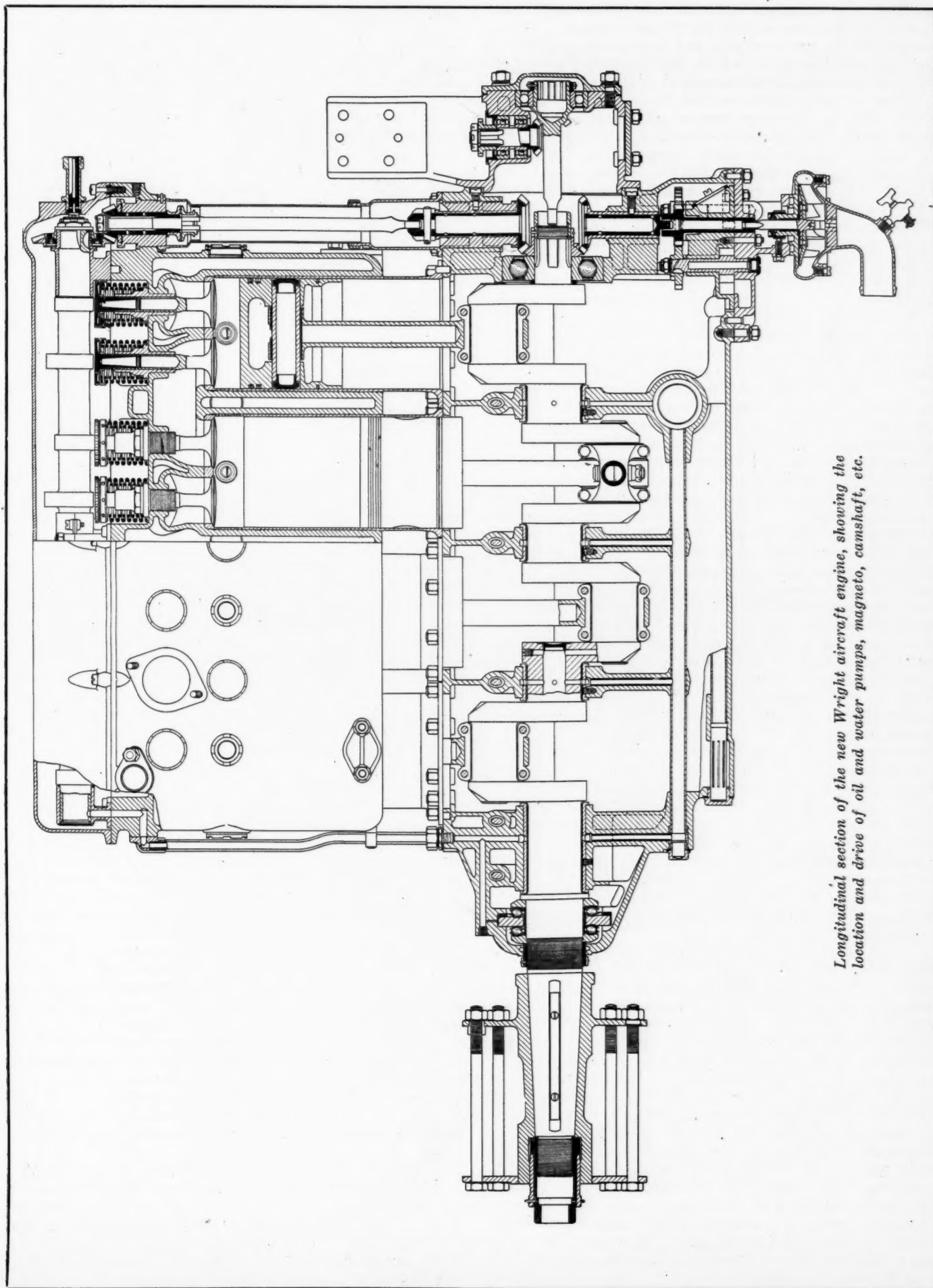
The pistons have no webs beneath the heads and are generally similar to the 300-hp. design, but the four rings have individual grooves and there is a change in the piston pins.

On the 300-hp. pistons the pins floated and were held endwise by fixed aluminum plugs like the Liberty design. The piston pins used in the new engine also float, but cylinder scoring is prevented by bronze plugs pressed in to each end of the pin. This considerably simplifies the piston machining and is equally effective.

Perhaps it is in the lubrication system that the Wright



Rear view of Wright aeronautic engine, showing new inclined mounting of magnetos



Longitudinal section of the new Wright aircraft engine, showing the location and drive of oil and water pumps, magneto, camshaft, etc.

engines have departed furthest from Hispano practice. It may be remembered that the Hispano motors had vane pumps for the pressure side and gear pump mounted on the extreme rear end, behind the magnetos, sucked oil from the crankcase and delivered it to the tank.

While perfectly effective, this design had three drawbacks. Firstly, the vane type of pump requires delicate fitting in the first place and is subject to loss of efficiency by wear. Secondly, the single suction pump having only one crankcase connection, needed a case with a deep sump. Thirdly, the separation of the two pumps called for rather a lot of external piping.

This design was first departed from in the Wright 300 hp. by the substitution of a single assembly of three gear pumps in the crankcase. The Wright E-2 has carried still further the elimination of connections, while the completeness of the distribution of oil has been improved.

As for the 300 hp., there is a single assembly of two suction and one pressure pump. This group of pumps is mounted on a base plate which mates with a surface on the bottom of the shallow crankcase. The main pressure line is internal, and so is the suction line which goes to the front end of the case. The ends of these two lines are brought to holes in the crankcase base, which lines register with ports in the base plate of the pump so that there are only two external connections to be made, one the delivery from the engine to the oil tank and radiator, the other the intake from the tank to the pressure pump.

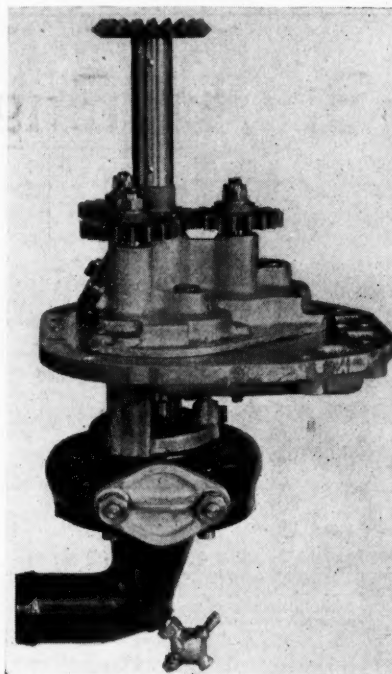
Oil is supplied in the first place to grooves in the bearing bosses of the crankcase which encircle the bushings, through the crankshaft to the connecting rods, and thence by spray to the other crankcase parts. From the front main bearing a lead goes to each of the front camshaft bearings, thence the oil flows through the camshafts, and out through holes which are drilled in the approach face of each cam, as well as through others leading to the center and rear end camshaft bearings.

In the original Hispano, excess oil from the camshafts found its way back to the base through the hollow vertical shaft which drives each camshaft from its rear end. This successfully disposed of excess during climbing, but when flying on an even keel or diving there was always a possibility of sufficient oil collecting to rise over the tops of the valve guides, with consequent fouling. To overcome this, the new engine has a return lead at the front end of each block of cylinders as well as holes around the vertical shaft bearing at the rear end.

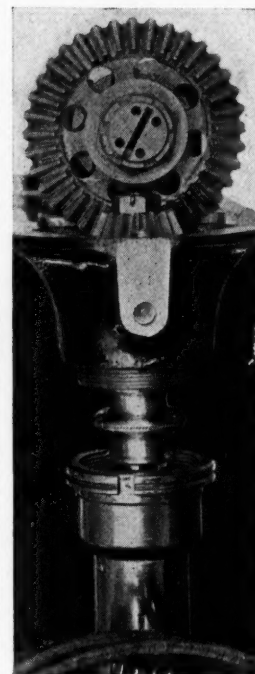
Another improvement in lubrication is the taking of a separate pressure lead from the main channel to the ball thrust bearing, it being believed that lack of adequate oil has sometimes caused this bearing to drag and so rotate a little in the crankcase.

Another feature of conspicuous advantage is found in the magneto mounting. The old design used two magnetos which were set in a horizontal plane on a transverse bracket bolted to the rear end of the crankcase, the drive being from the end of the crankshaft through a slot and tongue to a smaller shaft bearing a spiral gear, and thence to a cross shaft with a magneto coupling on each end. This construction called for one right hand and one left hand magneto and also had the disadvantage that the magneto bracket came in such a position that the bed timbers of fuselage could not be extended rearward.

In Model E-2 the magnetos are set at an angle to each other, which lifts them out of the way of the fuselage members. Also, instead of the single transverse shaft the bracket carries two short shafts each provided with a bevel pinion the two meshing with a single bevel which takes the place of the spiral gear. This makes the rotation of the magnetos both alike and so simplifies the handling of spares.



The three oil pumps grouped in a single assembly fitting into the crankcase, with water pump below and outside the crankcase



Positive clutch used in camshaft drive to enable fine angular adjustment in timing valves

Mentioning spare parts, it has been an object in laying out the new model to use as many as possible of the details of the 180 hp. engine, which was made in large numbers by the Wright-Martin Corp. and for which there are still fair stocks of spares in various places. Thus the marine type connecting rods which were the first American innovation and the first departure from Hispano practice are retained unaltered. The crankshaft and camshafts are identical, the water pump is the same, although it attaches to a quite different type of oil pump, and so on throughout the smaller parts.

WHILE it is important to maintain a low-pouring temperature for casting aluminum alloys, it is equally important to avoid overheating the metal in the furnace charges. Doubtless some advantage is gained when overheated melts are allowed to cool to the correct pouring temperature, and part of the danger of overheating is minimized by so doing. Nevertheless, for aluminum, overheating is very objectionable, because of the rate of dissolution of iron from cast iron melting pots and of the reduction of silica from clay crucibles, as well as absorption of gases from the local atmosphere. For molten metals, the absorption of gases increases with rising temperature, this being possibly due to the fact that metals form loose compounds with hydrogen and nitrogen. The absorbed gases are often held by the metal until solidification starts, when they are liberated and cause unsoundness. Hence, an overheated melt would contain more absorbed gases than one not overheated, and it would be expected that castings poured from former would be more unsound than those poured from latter.

IT has been the experience of the R. A. F. in Palestine and Mesopotamia, where atmospheric temperatures are generally quite high, that water-cooled engines almost invariably boil their water away; whereas air-cooled engines continue to work. The explanation offered is that an air-cooled engine will continue to function at higher temperature than that at which water boils away.

A High Speed Engine With Positively Operated Valves

But one poppet valve per cylinder is used, this being put in communication alternately with inlet and exhaust ports by a rotary distributor placed lengthwise of cylinder head casting. Yoked rocker levers have two rollers in contact with opposite sides of cam. Cooling of valves by incoming charge makes it possible to use higher compression without knock.

WHILE the ordinary spring-retained poppet valve works satisfactorily at low speed, difficulties are encountered at extremely high speeds which are used in racing engines and some stock engines. Naturally, the higher the speed of the engine the stronger the spring must be to keep the cam follower in contact with the cam, and the stronger the spring the greater the strain on the valve and usually also on the material of the spring itself. The difficulty usually lies either in noisy operation or in excessive strain on the valve mechanism at high speed. Moreover, the speed at which the engine gives its maximum output is dependent upon the ability of the valve and valve follower to follow the cam outline.

In racing engines mechanically opened and closed valves have been used repeatedly in the past. The problem of designing a poppet valve mechanically operated both in opening and closing involves considerable difficulty, for whereas the pressure within the cylinder during the compression and power strokes takes up any slackness there may be in the valve mechanism and moves the valve toward its seat, if it is not already there, the suction in the cylinder during the inlet stroke tends to raise the valve off its seat and to allow spent gases to be drawn back into the engine if there is any slackness in the mechanism. And it is, of course, impossible to eliminate all play and flexibility from a valve operating mechanism consisting of several very light parts.

In a design of engine due to R. Abell, and which is illustrated herewith in cross section and longitudinal elevation partly in section, only a single poppet valve is used per cylinder. This valve serves for both the inlet and exhaust. The function of the valve is determined by a rotary distributor which places the poppet valve pocket in communication alternately with inlet and exhaust ports.

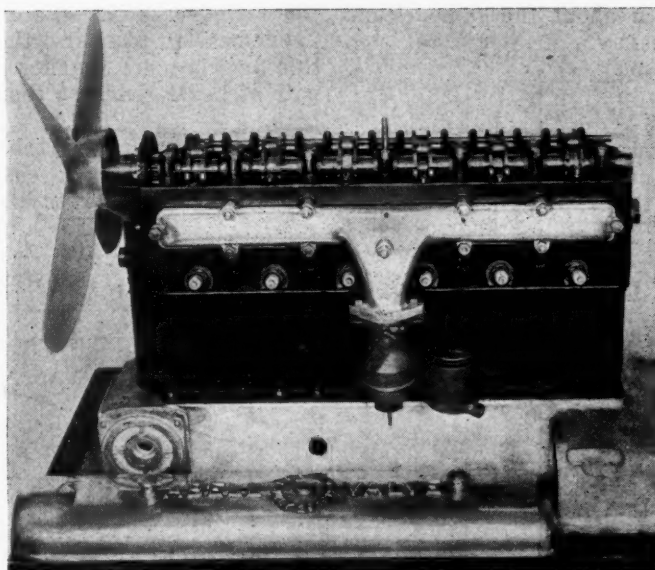
The engine is a six cylinder block cast type of $3\frac{1}{4}$ in. bore x 5 in. stroke. Both the poppet valve and the distributor are mounted in the cylinder head, which is detachable and is bolted to the cylinder block with the usual copper-asbestos gasket between. The combustion cham-

bers, which are located in the cylinder head, are hemispherical in shape and are completely machined. Two spark plug bosses are provided, on opposite sides of the cylinder head. The overhead camshaft is located in the center plane of the cylinders and is operated from the crankshaft through a vertical shaft at the forward end of the engine which is provided with bevel gears both at top and bottom. This vertical shaft is a high speed shaft, being geared up from the crankshaft in the ratio of 3 to 4, and can therefore be quite light. It is enclosed in a "V"

shaped extension at the forward end of the cylinder casting and is provided with a splined sliding joint to make allowance for the heat expansion of the cylinder block.

The valve rocker levers are yoke shaped and are provided with rollers on opposite sides of the cams. The cams are of unusual shape and they completely fill up the space between the rollers throughout the cycle. There is, therefore, no lost motion in the whole mechanism at any point of the cycle, and the valve must absolutely follow the outline of the cam. The rocker levers are mounted on a hollow shaft which is carried by the caps on the camshaft bearings, and after removing the nuts from the studs of the bear-

ings, the entire valve mechanism, including the camshaft, can be removed from the engine. The poppet valve, which is bowl shaped for lightness and ease of opening and closing, has a clear diameter of $1\frac{13}{16}$ in. and a lift of $\frac{7}{16}$ in. The seating of the valve can be adjusted by means of a spool which is locked in place by a castellated nut and cotter pin. In adjusting the valve, it is brought to within a few thousandths of an inch of its seat, and the inertia on the valve and the compression pressure can be relied upon to close it. The poppet valve begins to open 45 deg. before the end of the power stroke and closes 45 deg. from the beginning of the compression stroke, thus remaining open for a period corresponding to a crank motion of 450 deg. When the crank is in the top dead center position at the end of the exhaust stroke the distributor is in its central position, both the inlet



Abell engine, showing crankshaft, double roller rocker arms and neat inlet manifold

and the exhaust port being closed. Consequently, the exhaust port closes and the inlet valve port opens simultaneously irrespective of speed.

The compression chamber is so dimensioned that a cold compression of 90 lb. is obtained, and with this compression there is said to be absolutely no knocking with the ordinary commercial gasoline. This is ascribed to the fact that there is no overheated exhaust valve with which the combustible gases come in contact and become ignited. After each exhaust stroke the incoming cool charge passes over the exhaust valve and cools it to such a degree that it never reaches a temperature beyond that corresponding to the bluing temperature of steel. It is claimed that, owing to the thorough cooling of the valve, it is possible to use a compression 20 lb. higher than is ordinarily employed. This results in a higher explosion pressure, increased power and reduced fuel consumption. Owing to the fact that the poppet valve has no spring and its spool is quite free on the end of the rocker lever, the valve continuously creeps around on its seat, which results in uniform temperature conditions and uniform wear over the whole valve head and prevents pitting and other valve troubles. Since the valves are not held down to their seats by springs and remain open throughout the exhaust and inlet strokes, the energy consumed in operating the camshaft is considerably reduced.

The distributor valve is made of cast iron and is cored out for lightness. To facilitate machining and foundry work it is made in halves, with a tongue and groove joint at the center.

The distributor valve is given about the same clearance per inch of diameter that is given a cast iron piston. Oil on the surface of the valve forms a sufficient seal as the pressure difference is small and any slight leakage which might occur has no material effect. Lubrication of the

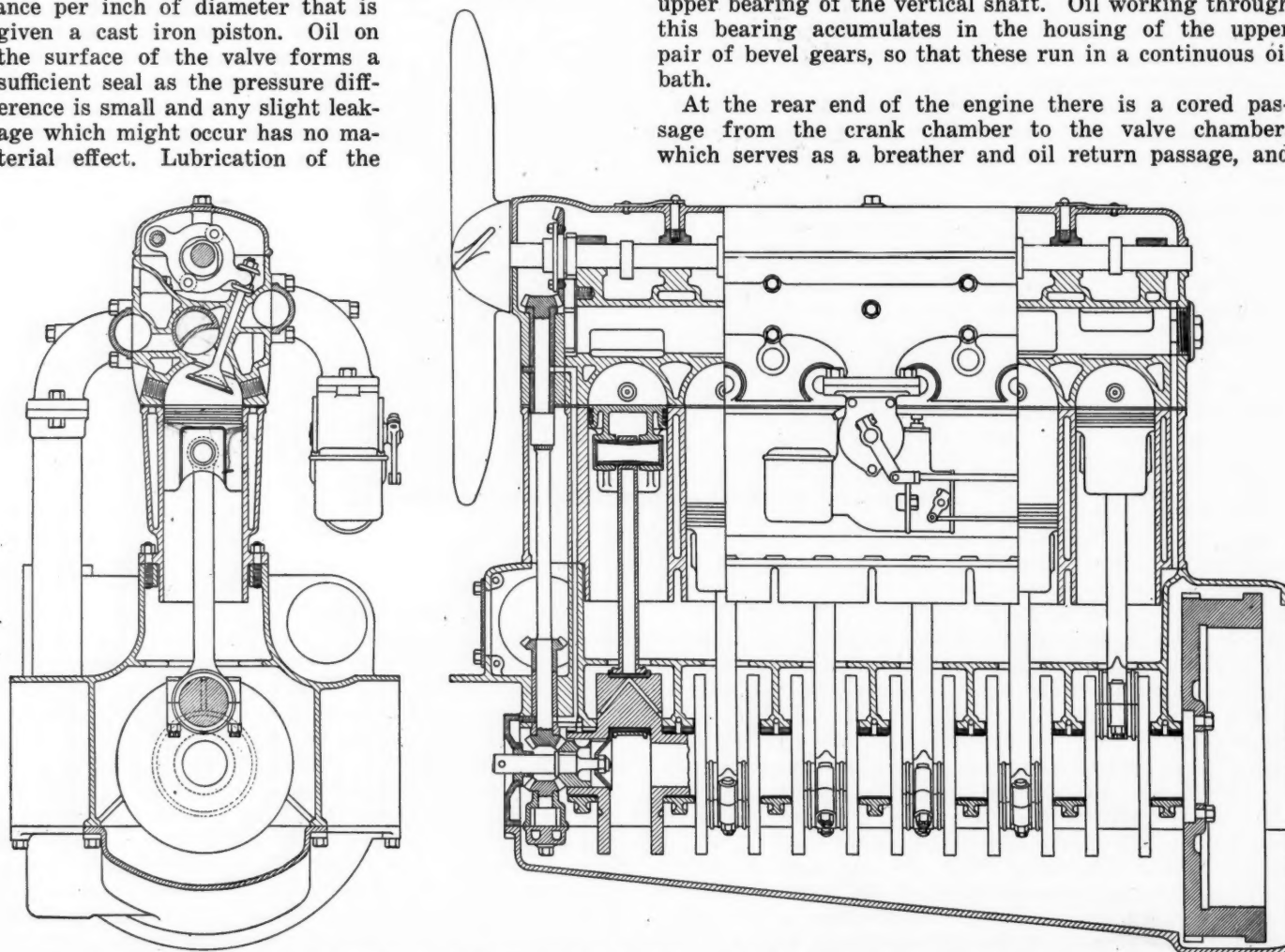
distributor valve is effected entirely by oil spray in the exhaust. Additional lubrication has been provided in some experimental engines, but was found to be superfluous, ample lubrication being provided by oil deposited by the exhaust gas. The temperature of the distributor valve is not high, due to the cooling effect of the charge which absorbs heat left by the exhaust gases.

One advantage of the construction employed is the fact that the incoming charge passes over surfaces of the distributor and poppet valves which have just been heated by the exhaust. This results in vaporizing the fuel and provides in effect the same hot-spot which in engines of the conventional type is arranged in a quite different manner.

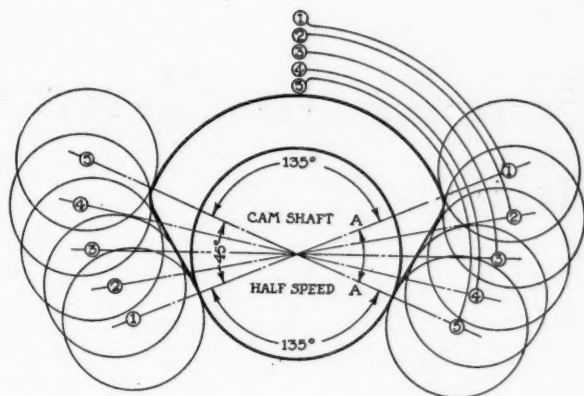
The large bevel gear at the forward end of the camshaft is made of bakelite in order to secure noiseless operation. This gear has 40 teeth, while the crankshaft pinion has 20.

Lubrication of the engine is by the pressure system from a gear pump mounted below the crankshaft ahead of the forward main bearing and driven by a bevel gear from the crankshaft bevel pinion. The crankshaft is supported in seven bearings. The main journals are $2\frac{1}{2}$ in. diameter, and the crank cheeks or webs are in the form of complete disks. Oil from the pump is delivered directly to each main bearing and thence finds its way through circular grooves on the crank disks and drill holes in the crank cheeks and crankpins to the crankpin bearings. A vertical oil passage is drilled in the forward wall of the crank chamber and the cylinder block. Through this oil is forced to the upper bearing of the vertical shaft. Oil working through this bearing accumulates in the housing of the upper pair of bevel gears, so that these run in a continuous oil bath.

At the rear end of the engine there is a cored passage from the crank chamber to the valve chamber, which serves as a breather and oil return passage, and



Transverse and longitudinal sections of Abell engine, showing positively operated poppet valve and rotary distributor valve



Layout of cam used on Abell engine

insures that the valve mechanism operates in an oil mist.

The valve mechanism is protected by a cast aluminum cover. Both parts of the crank chamber are also of aluminum, and the weight of the complete engine without starter and generator is only 360 lb. The cylinder barrels extend some distance into the crankcase, and baffle plates are provided in the upper half of the crankcase to prevent over-oiling and cylinder carbonization. The pistons are cast of aluminum and are of the slipper type. Each piston is provided with three rings at the upper end. The connecting rods are tubular, 10 in. long and of 13/16 in.

outside diameter. The hollow piston pin has an outside diameter of 1 in.

In view of the fact that the engine is designed for operation at high speed, an attempt was made to reduce to a minimum the weight of reciprocating parts. The total weight of the piston, rings, piston pin, connecting rod, cap and bolts is only 2½ lb.

This engine is expected to develop its maximum power at 4000 r.p.m. and to show a straight horsepower line up to 3000-3200 r.p.m. It is expected to obtain 30, 60 and 90 hp. at 1000, 2000 and 3000 r.p.m., respectively, this estimate being based upon the performance of previous designs.

One of the features of the Abell engine is the arrangement of the manifolds. These are formed one-half in the cylinder head casting and one-half in the manifold castings. Each half of the gas passage being of semi-cylindrical form, these passages can be ground and polished, so there will be no obstruction to which unvaporized fuel particles can adhere. A baffle plate is cast into each manifold between the third and fourth cylinders, so that there can be no interference between the front and rear cylinders. The firing order is 1-5-3-6-2-4. A 1½-in. carbureter is fitted. The radiator fan is secured directly to the front end of the camshaft and no separate fan drive is required. The fan is four-bladed, is cast aluminum and is provided with a friction clutch to take care of sudden acceleration and deceleration of the engine.

A Re-atomizing Device

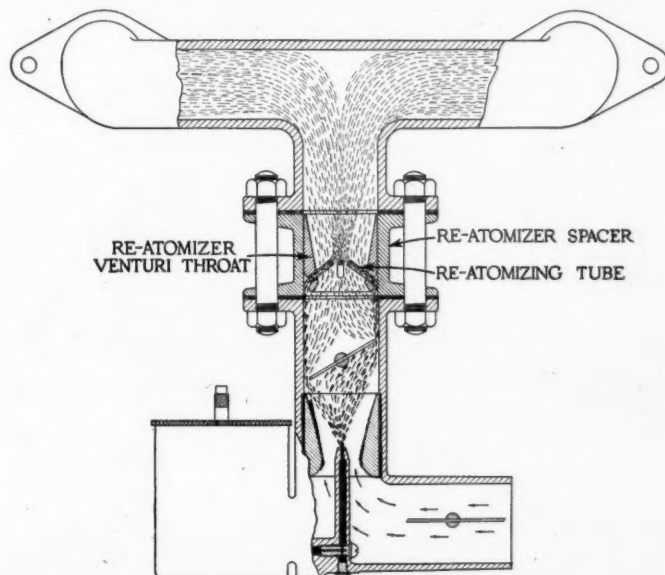
THE carbureter department of the Penberthy Injector Co. announces the Ball & Ball re-atomizer, a device recently invented by F. O. Ball, which is placed between the carbureter and the manifold. It comprises a spacer into which is pressed a venturi throat carrying four small tubes. The spacer contains a passageway of the same diameter as the intake manifold.

The grade of gasoline sold to-day is extremely difficult to vaporize completely, and even when the vapor has been made it is easily condensed by striking obstacles to its free passage. The butterfly valve used in all carbureters, when only partly opened presents such an obstacle. As the vapor strikes this butterfly valve, the larger portion of it is condensed and thrown against one wall of the carbureter and some passes up the wall of the manifold in a liquid form

and cannot be equally divided between the various cylinders.

Around the lower outside edge of the re-atomizer is a groove or annulus which forms a small circular chamber between the inside or the spacer and the outside of the re-atomizer. The ejector effect of air flowing by a tube extending into the air stream in the direction of flow of the air is very well known. This principle is the basic idea of this re-atomizer. The ejector effect on the four tubes which extend into the throat tends to draw into the annulus any liquid gasoline which may be passing up the wall of the carbureter and to eject it from the tubes in an atomized condition so that it floats in the air stream and goes equally to the different cylinders.

It is claimed that this re-atomization of the gasoline makes it possible to adjust the carbureter for a much leaner mixture, thus lowering the fuel consumption and reducing crankcase dilution.



Sectional view of re-atomizer

THERE is a grave necessity for adequate records covering inventions, if the inventor is to gain the full fruits of his ideas and labor. "Where litigation cannot be avoided, thousands of dollars are lost annually by the failure of inventors and their associates to keep adequate records of their inventions, their development and reduction to practice, and early commercial history. . . . This expense is unnecessary if adequate records are kept of the essential steps and their dates in connection with inventions."

To point out these essential steps and direct the inventor how to take them is the purpose and scope of the little volume on "How to Keep Invention Records," recently published by D. Appleton & Company.

The first part of this 82-page volume discusses the general nature of industrial property and monopolies granted to protect it. A practical method of insuring this recording of dates is presented in the second part, while a final chapter deals with methods of patent investigation.

Some New Parts Seen at the New York Show

Two new axles, one of which uses two cone clutches in place of differential, are shown. New flexible universal of laminated steel, an automatic advance magneto coupling, and a lubricating system for transmission universals and axle, are among the recent developments.

By P. M. Heldt

A NEW line of axles was exhibited by the U. S. Axle Co. The front axle is designed to permit turning in a small radius and will be made for either right or left hand steering. The axle center and steering knuckle are drop forgings, heat treated. The steering knuckles swing on adjustable tapered roller bearings and the front wheels turn on bearings of the same type. The steering arms, of drop-forged chrome vanadium steel, are designed with a high factor of safety. The tie rod is behind the axle center and thus well protected. It is made of seamless steel tubing tapered toward both ends. This axle has a load capacity up to 1400 lb.

The rear axle is of the semi-floating type with helical bevel gear drive. It has a load capacity up to 1900 lb. and can be made in a larger range of gear ratios. The axle shaft housings are of tapered, seamless steel tubing with spring seat and brake anchor riveted to the outer end. The inner ends are flanged and bolted to malleable iron or aluminum alloy gear housings. The pinion housing can be furnished of aluminum alloy or malleable iron, adjustable or non-adjustable type; it carries two adjustable taper roller bearings which take both thrust and radial loads.

The drive and differential gears are of alloy steel and the axle shafts of molybdenum steel. Axle shafts are ground to size and are splined to fit the differential; they can be easily removed without disturbing either the gear housing or the differential assembly. The outer end of the shaft is mounted in a self-aligning, double row ball bearing. A heavy spring is inserted between the wheel hub and the ball bearing to minimize lateral shocks.

Hubs of symmetrical design are furnished, for wood, wire or disk wheels. Both the service and emergency brakes are of the expanding type and are arranged side by side within the same drums. The service brake is $1\frac{3}{4}$ in. wide and the emergency brake 1 in. The pressed steel brake drum is 14 in. in diameter and the brakes are actuated by means of cams. The reason given for using expanding brakes only is that where contracting brakes are used it often happens when non-skid chains are fitted the cross chains tear, catch the brake rigging and practically rip it off the axle.

A rather radical design of rear axle was exhibited by the Stokes Engineering Co., Inc. No differential gear is used, but instead there are double friction clutches in each wheel, of the conical type. These clutches are operated automatically by means of steep pitch, square thread screws in the hubs of the central driving gear. One of the clutches is used for forward drive and the other for reverse.

A universal joint employing flexible members of laminated steel was exhibited by Chilton Universal Joint, Inc. The laminations are made by punch press operations of

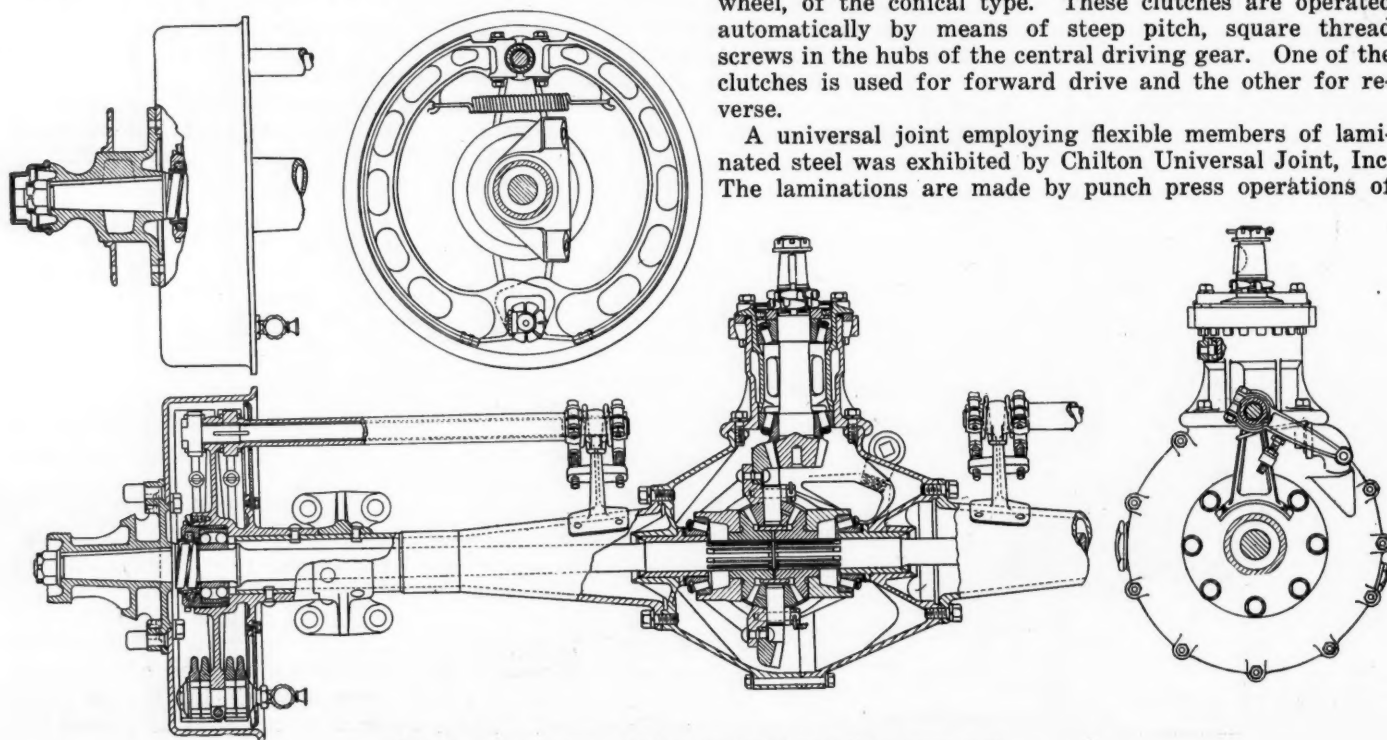


Fig. 1—U. S. semi-floating, helical bevel drive rear axle

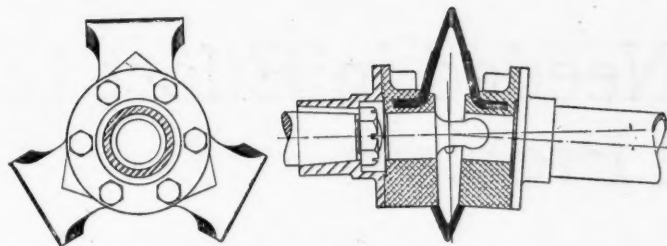


Fig. 2—Chilton flexible universal joint

tempered and polished blue spring steel strips. The hubs are flanged for connection to the usual automobile transmission shaft flanges; they are of a special alloy and are cast around the ends of the driving springs in permanent mold machines. The spring ends extend far into the hubs and are notched to insure a perfect bond. It is stated that on tests to destruction the springs will be broken without loosening in the hubs. Three sets of laminae are used in each joint. As the flexible members are cast in the hubs the whole joint is one piece, and it requires no lubrication or attention by the operator. The illustration shows the construction. When two of these universals are used in an automobile drive no slip joint is required.

The Splittorf Electrical Co. has brought out an automatic advance coupling for magnetos. It consists of a centrifugal governor of simple and compact design as shown in Fig. 3. The governor weights are pivoted to the housing and connect by links to a spider on the shaft in such a way that as the weights move outward from the axis of rotation under the action of the centrifugal force and against the pressure of laminated springs secured to their outer sides, the shaft is angularly advanced relative to the housing substantially in proportion to the speed. The Model V is made for truck and tractor engines and can be installed on any Splittorf magneto without change in the magneto. The minimum advance is obtained at 600 r.p.m., the maximum at 1300 r.p.m. The coupling weighs only 1 lb. 3 oz. Model W is designed for use on passenger car engines. It gives a minimum advance at 400 r.p.m. and a maximum advance at 1800 r.p.m., the weight being 1.5 lb.

A transmission and drive lubricating system was exhibited by the Merchant & Evans Co. A gear type pump is located in the rear axle housing, an oil reservoir on the forward side of the dashboard and a sight feed or circulation indicator on the instrument board. The oil from the reservoir passes through the transmission, the hollow propeller shaft and the hollow bevel pinion shaft into the differential housing. While the car is standing there is a

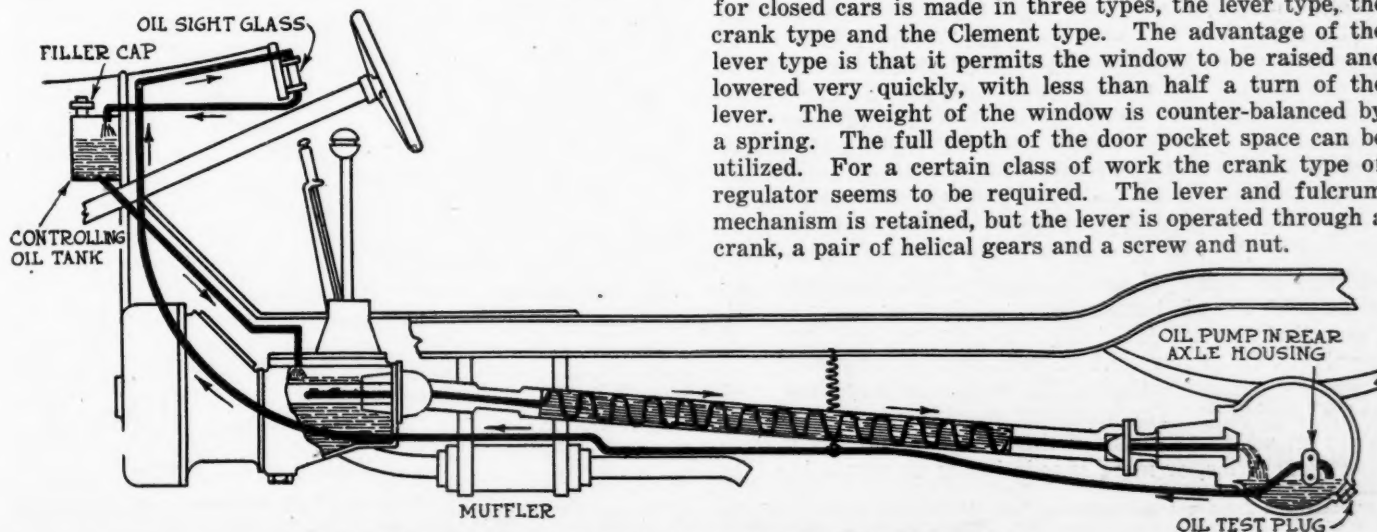


Fig. 4—M. & E. transmission and drive lubricating system

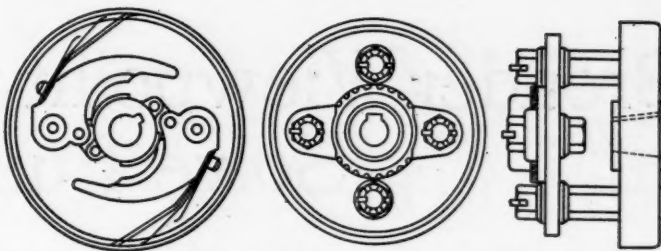


Fig. 3—Splittorf automatic advance coupling

tendency for the oil to flow toward the rear by gravity and when it is first started up the oil level in the differential housing is somewhat above normal. As soon as the car is started the pump delivers some of this oil through the circulation indicator to the reservoir, movement of the oil continuing until the level in the differential housing falls below the pump inlet. The indicator therefore will show oil flow only for a short period after starting the car. One of the advantages claimed for the system is that by maintaining a constant oil level in the rear axle housing oil leakage from the axle is prevented. In order to apply it to a car it is necessary that the universal joints as well as other parts lubricated be oil-tight. When first filling the system the oil should preferably be heated, as it will then flow more freely. It is necessary to add about a pint of oil to the supply in the tank every month. A test plug is located in the differential housing at the level at which it is desired to carry the oil, and oil is poured into the tank until it begins to flow from the test hole.

Models of the Dura window regulator were shown by the Dura Mechanical Hardware-Co. This window regulator for closed cars is made in three types, the lever type, the crank type and the Clement type. The advantage of the lever type is that it permits the window to be raised and lowered very quickly, with less than half a turn of the lever. The weight of the window is counter-balanced by a spring. The full depth of the door pocket space can be utilized. For a certain class of work the crank type of regulator seems to be required. The lever and fulcrum mechanism is retained, but the lever is operated through a crank, a pair of helical gears and a screw and nut.

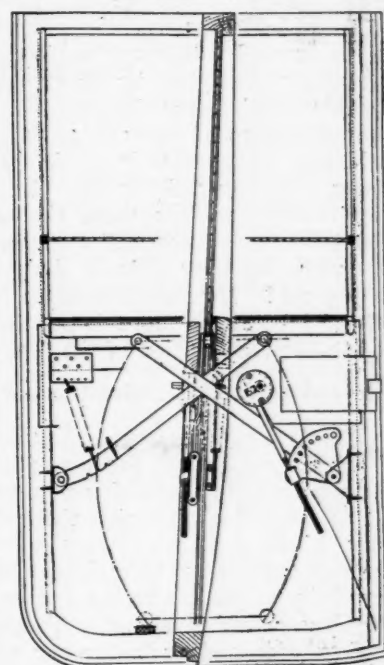


Fig. 5—Crank type of Dura window regulator

Broader Viewpoint Needed in Effort to Solve Fuel Problem

Author demonstrates the importance of breaking away from outworn notions, and shows how by thorough tests and careful analysis of results it has proved possible to nearly double the mileage of a given car per gallon of fuel, while at the same time power is increased, and general performance bettered. New constant clearance piston also described.

By A. L. Nelson*

THE object of this paper is to appeal for a broader viewpoint and give a few illustrations and tests which show that the solution of a problem may lie in an entirely different method than that which often becomes stereotyped by sheer usage, rather than by its specific merit. We know off-hand the general engine characteristics of our engines at full, three-quarter, one-half, and one-quarter load. We know the power, friction losses, economy and the like. This is all very proper and applies very well to what the engine *can do*, but how about the more important questions of engine characteristics while working at loads that it is *called upon to carry* in the car? How much specific information can we give off-hand on these more important engine characteristics so vital to the solution of the fuel problem?

Power Required to Drive the Car at Constant Speed

Fig. 1 shows the engine brake horsepower required to drive the car tested, the brake horsepower available and the percentage of available power used at each speed.

The method of obtaining these data was to drive the car on a given course at constant speeds corresponding to a fixed carburetor throttle setting, then to remove the engine from the car to the dynamometer stand and determine the power developed at those settings and the engine speed corresponding to the car speeds. It was necessary to duplicate very accurately the fixed throttle settings when the engine was put on the dynamometer; hence, a micrometer adjusting screw was attached to the carburetor throttle-shaft. The speed of the car was obtained by timing with a stop-watch on a 1/2-mile measured course, driving in both directions for each setting, to eliminate the effect of wind resistance, and taking the average speed. The engine speed was calculated from the number of revolutions per mile made by the rear wheels. Several important details, such as cooling water temperatures, oil temperatures, air pressure under the engine hood, and the like, need not be given here. For accurate work it is suggested that, in addition to the use of fixed throttle settings, manometer readings be taken of the intake-manifold depression together with the air temperature. Referring again to Fig. 1, note that at average driving speed the engine is working at only 16 to 19 per cent of full load. Poor economy is caused by misapplication of the engine rather than poor engine economy. The analysis should give us relative values on which to consider the feasibility of using two-speed rear axles, or more speeds in the transmission. Or

PARTICULARS CONCERNING CAR TESTED, TEST CONDITIONS, COURSE, ETC.

Outdoor temperature (average), deg. fahr.	76
Barometer (average) in. of mercury	30.15
Weight of car with fuel and two spare tires, lb.	4,340
Weight of driver, lb.	180
Total weight of car and driver, lb.	4,520
Tires	Firestone Cord
Size of tires, in.	33 x 5
Air pressure, rear tires, lb. per sq. in.	50
Air pressure, front tires, lb. per sq. in.	45
Course	Indianapolis Speedway
Pavement	Brick
Length of course, miles	1/2
Direction of driving	North and south
Revolutions of rear wheel per mile	600
Exhaust cutout	Open
Oil	Mobiloil B

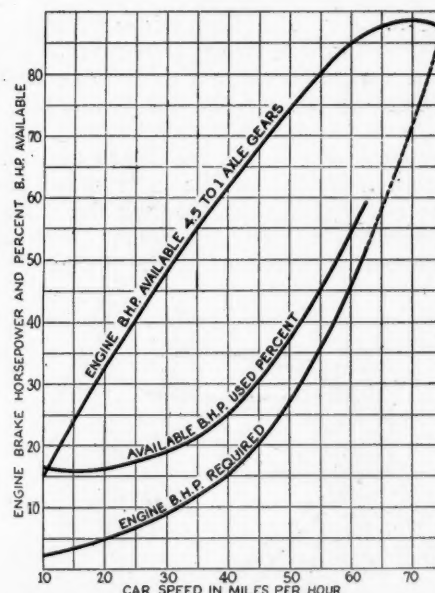


Fig. 1—Comparison of engine power with power required to propel car; showing low load factor

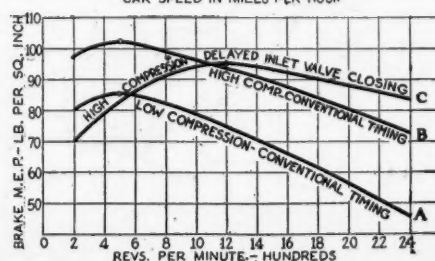


Fig. 2—Effect of valve timing and compression on mean effective pressure

*Condensed from a paper presented at the annual meeting of the Society of Automotive Engineers. Mr. Nelson is chief engineer of the Premier Motor Corporation.

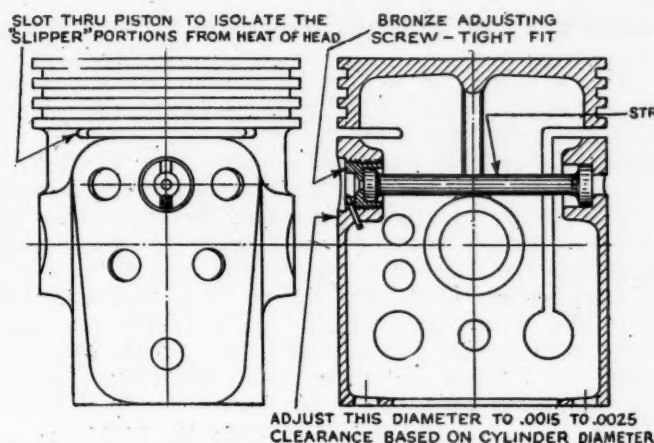


Fig. 3—Constant clearance aluminum piston, showing means for adjusting initial clearance

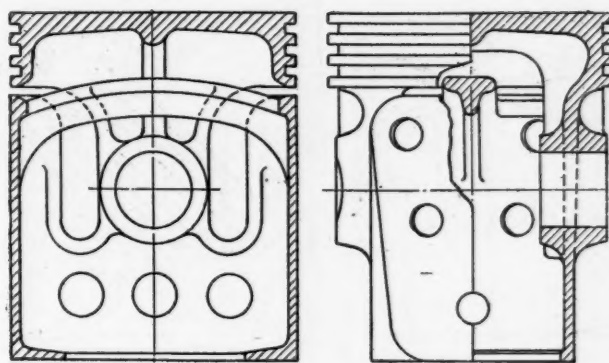


Fig. 4—Type of constant clearance aluminum piston with steel strut cast integrally with slipper portion

perhaps an entirely new and better way will be devised eventually to keep the load factor of the engine high to obtain better economy.

The conditions revealed by the correlation of engine and car characteristics are so bad as to make it evident that both the public and engineers need a decided change in viewpoint; the public in what they demand, and the engineer in what to furnish and in what to educate the public to expect.

Higher Compression Ratios

As an illustration of the need for change in viewpoint, let us consider the effect of using higher compression ratios. We all know that the compression ratios used in aviation engines give us much higher fuel economy than those used ordinarily in automobile engines. Then why not use high compression ratios for automobile engines? We are told that higher compressions make the engine knock badly. The simplest and generally accepted way of getting rid of knocking is to lower the compression ratio. Shall we accept this way as final? Why not try to accomplish the same result some other way and at the same time maintain the higher economy?

An engine at full load may knock badly at 500 r.p.m. and perhaps will not knock at all at 1200 r.p.m. If we study the curve of brake mean effective pressure, we will find that, at 500 r.p.m., the brake mean effective pressure is greater than at 1200 r.p.m. Curve B, Fig. 2, illustrates this. By lowering the compression to eliminate the knock, we obtain curve A. Suppose we go back to the higher piston compression ratio and at the same time we delay the inlet-valve closing. Experiments show that we get a brake mean effective pressure in accordance with curve C, the peak of the curve coming at a higher speed than that given by the conventional timing. The pressures at the lower speeds are reduced, which is the desired result to overcome the knocking, while the pressures at the higher speeds are materially increased.

The exact timing to use depends on the valve sizes, intake passages, carburetor characteristics and similar factors. The results obtained are more far-reaching than merely keeping the pressures within a range to eliminate the knocking at the lower speeds, and increasing the power at higher speeds. The most desirable results are obtained under car-driving conditions. The small charge of mixture required is taken into the cylinder and compressed to a smaller volume than in the case of the lower compression; also the charge is purer, due to the better scavenging of the higher compression pistons. Tests for 5 to 1 and 4.25 to 1 compression ratios at full load show increases of

13 and 24 per cent in the brake thermal efficiencies at 700 and 2100 r.p.m. respectively; while at these same speeds and at loads required by the car the increases are 22 and 41 per cent respectively. (See Figs. 23 and 24, at 20 and 60 m.p.h., respectively.) These results are representative of only the first attempt, yet they are quite appreciable gains in economy, due solely to the change in compression ratio.

Consider next the aluminum piston, which is almost universally used in aviation engines. The high thermal conductivity of aluminum allows the heat to flow from the pistons more freely than from any other metal commonly used, contributing highly to the best known results obtained from high-speed internal-combustion engines. Why are the aluminum pistons for automobiles, though largely used, condemned by some of our leading designers of national reputation? They know the sterling qualities of the aluminum aviation pistons that make the high power and economy of aviation engines possible, yet for their automobile engines they use cast iron which perhaps could not possibly be used in the aviation engines with the high compression ratios. They tell us the trouble is that the aluminum pistons expand so much when heated that they require excessive cylinder clearance and that this allows them to slap at the lower speeds, or, if fitted closer, to stick at the higher speeds. As an alternative they select cast-iron pistons, use lower compression and get lower economy and greater torsional vibration of the crankshaft due to the heavier reciprocating parts and occasionally scoring the cylinder blocks. Some engineers say, in addition, that the hotter cast-iron piston helps to vaporize the liquid fuel that comes in contact with the head of the piston.

Constant-Clearance Aluminum Piston

The specific heat of aluminum is greater than that of iron, but the density of iron compared with that of aluminum gives us a heat capacity per unit volume of aluminum only 68 per cent that of iron. However, the conductivity of aluminum is 2.85 times that of iron. From these figures it will be seen that even if the iron piston was $1\frac{1}{2}$ times as hot as the aluminum piston, the heat flow to the liquid fuel in contact with the aluminum piston-head would be about 30 per cent greater, and that, for same temperatures, the heat flow would be about 94 per cent in favor of the aluminum. Since the aluminum piston-head is usually made thicker than that of cast iron, the amount of heat available would be approximately the same in both cases. It appears that the two pistons are on a par, except that heat flow is greatly in favor of the aluminum piston. It has become a habit to think that aluminum pistons must expand. Why not design an aluminum piston that cannot

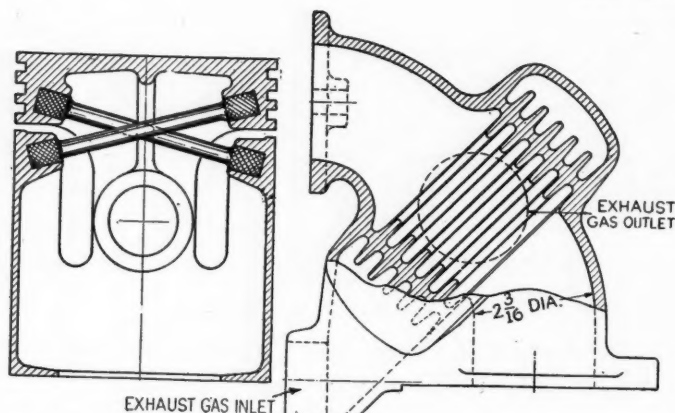


Fig. 5—Type of aluminum piston in which clearance increases as the piston is heated

Fig. 6—Transverse section of intake pipe, showing exhaust heated ribs for vaporizing fuel

expand as far as cylinder clearance is concerned? This viewpoint changed the complexion of the whole problem and led to the development of an aluminum automobile piston design that gives results believed to be in advance of the combined merits of the aviation piston and the cast-iron piston.

This piston is illustrated in Fig. 3. In this design the adjustable steel strut controls the cylinder clearance in the direction which prevents piston slap. It will be noted that the aluminum has nothing to do with the cylinder clearance. The strut is subject to almost the same temperature range as the cylinder; hence, the clearance remains constant through the range from a stone-cold to a steaming-hot engine. This type of piston proved very successful from the outset. It is the only type of piston, regardless of material or design, that we have not been able to make stick under abnormal conditions. It has absolutely no slapping tendencies even in a stone-cold engine. Maximum car speed can be maintained indefinitely without causing the pistons to stick. For a more severe test the pistons were run at full load for 30 min. at 3000 r.p.m., with the radiator cooling water shut off so that the engine steamed continuously during the run. This run was made at the end of a full day of high-speed testing with no provision for cooling the oil. The cylinder clearances of the pistons were less than those of any cast-iron pistons that are so far as we know used in quantity production. Two of the pistons had cylinder clearances of 0.0015 in., based on the diameter. The other four pistons had clearances from 0.0020 to 0.0025 in.

In spite of all the abuse we have been able to impose on this type of piston, the pistons have always come out of the tests entirely free from any scoring marks and show a decided general tendency to polish-up smoother than the conventional aluminum piston. This undoubtedly follows from the maintenance of the proper clearance at all times, thus avoiding excessive bearing loading. Another striking characteristic of the pistons is their smoothness of operation, indicating that even when the slap in the conventional piston is not audible there is a rumbling sound which becomes noticeable when compared with the operation of the constant-clearance piston. This difference is very marked at both high and low speeds. When the pistons are used with the conventional timing, the knock at full load and low speeds is very materially subdued compared to the conventional type of piston. This clearly shows that cylinder piston clearance has much to do with the degree of audibility of the knock.

Fig. 4 illustrates a design which has the strut cast integrally with the "slipper" portion of the piston, the latter being well insulated from the heat of the piston-head by being separated from it. An alternative of this

design is a steel strut cast in place or fastened in some suitable manner.

Fig. 5 illustrates an aluminum piston that contracts when heated, so far as cylinder clearance is concerned. The steel struts in this case are shown cast in place. The reason the cylinder clearance increases with the heat on the piston is that the ends of the steel struts attached to the piston-ring-groove portion of the piston-head are carried outward, drawing the "slipper" portion inward since they are attached to the opposite ends of the struts. A large variety of designs can be made embodying the strut idea to accomplish variations of cylinder clearance adjustment and the like, as may be desired for particular cases. It is hoped that these piston illustrations will fix the idea firmly that, so far as cylinder clearance is concerned, we have nothing to fear from the highly expansive aluminum as a piston material. As for the practical merits of the constant-clearance type of piston, they must be tried to be appreciated, because the results they give are so far in advance of one's highest expectations. The results are indeed a striking illustration of what can be accomplished by a mere change in viewpoint.

Fuel Vaporizer

Consider now the general experience with exhaust-heated intake-manifolds. It is generally agreed that the results are fairly good, at the expense of a loss of maximum power due to heating the air. On heating the fuel by "hot-spots," the air is also heated. The experience has been so general that it has practically fixed in many minds as an irrevocable fact that using exhaust heat must necessarily and unduly heat the air. To show that this is not the fact, first let some suppositions be given which can be agreed to readily.

Suppose we run all the hot exhaust gases through a jacketed intake pipe, say some 10 in. long, to get ample surface for the "hot-spot"; that is, ample surface to transmit the exhaust heat required to vaporize the fuel, which, it has been observed, goes to the walls of the intake pipe or points of lowest air velocity. Such an intake pipe works well but it also heats the air, coming into contact with the large highly heated surface with the result that the maximum power cannot be obtained. Suppose we now corrugate the intake-pipe so that the air passage is say $2\frac{1}{2}$ in. long, without reducing the area of the inner or outer surface. Fig. 6 shows a cross-section of such an intake pipe designed for the 295.2-cu. in. six-cylinder engine used in the tests. Note the relatively small amount of exterior exposed surface of the heating chamber, an important item for starting out with a cold engine, and the efficient heating of the pipe at low car speeds. The heated portion of the pipe is set at an angle above the carburetor so that the inertia of the fuel globules will throw them directly into the large highly heated surface. The flow of liquid following the wall is toward the inner or smaller radius of the bend. Gravity helps to make the liquid flow over the heated surface. It cannot get out again into the airstream before being highly vaporized. The highly heated corrugated surface effectively traps the fuel and quickly vaporizes and super-heats the vapor. Tests indicate that the air is very slightly heated while the fuel is highly vaporized. Kerosene is vaporized as readily as gasoline, even at speeds as low as 200 r.p.m. with wide-open throttle. The air is slightly heated because only a very small portion of the air comes in contact with the edges of the ribs at the inner diameter. Tests in which the intake-pipe was abnormally heated, have been run with a loss of only 1.2 per cent of power at 1200 r.p.m. and 2 per cent loss of power at 2400 r.p.m., compared with the best results that could be obtained from the most favorable degree of heat or from unheated plain manifolds. The design as shown

does not strictly confine the heat to the ribbed portion for practical reasons.

The effect of the intake pipe construction upon the remainder of the intake passages to the cylinders is very important. Off-hand it would appear as though the deep ribbing would offer a severe obstruction to the fuel passing to the cylinders. Let us compare what happens with that of the ordinary manifold where the fuel as a rule travels very much slower than the air-stream flowing along the manifold walls. A considerable time interval occurs between the time the fuel leaves the carbureter nozzle and the time it reaches the cylinder. In the case of the intake pipe, Fig. 6, and the remaining passages to the cylinder, the heavier parts of the fuel are momentarily arrested, but they are highly vaporized quickly and pass to the cylinder at the same speed as the air-stream. Since a highly heated surface can be used without heating the air, the vapor becomes so highly heated that it does not condense while in the air-stream. Of course, the vapor going into the air-stream receives a high velocity on the outset, and the time interval for it to condense is small.

Most convincing observations are made when applying 2-in. carbureters to the engine, both on the dynamometer and on the road. For speeds below 800 r.p.m. with open throttle, the plain unheated intake-pipe could not be used at all. Even at higher speeds the economy was poor although the power was good, indicating poor distribution. With the new design intake-pipe the engine could be run as low as 200 r.p.m. with wide-open throttle. However, this was not true with 2-in. plain-tube carbureters which we have tried without making structural modifications in the design.

Application of the exhaust-heated intake manifold made

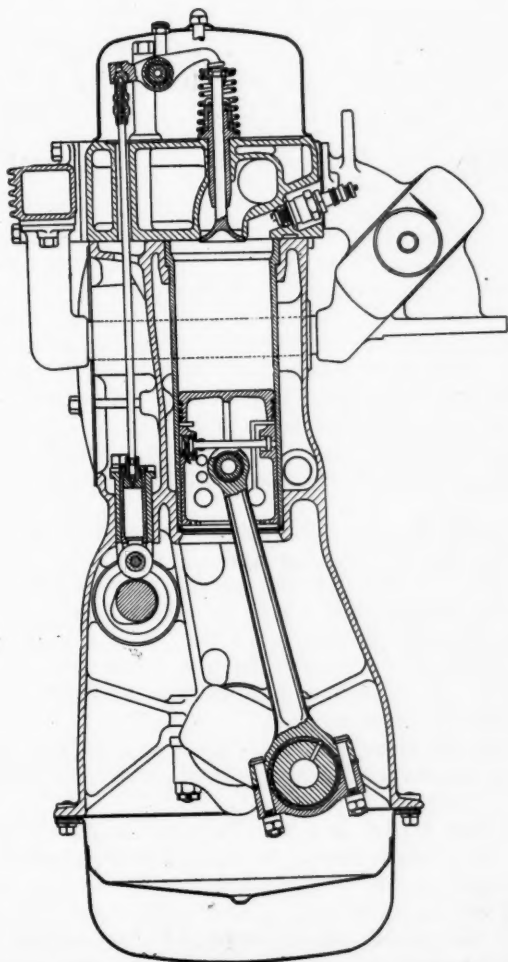


Fig. 7—Transverse section of engine used in the test

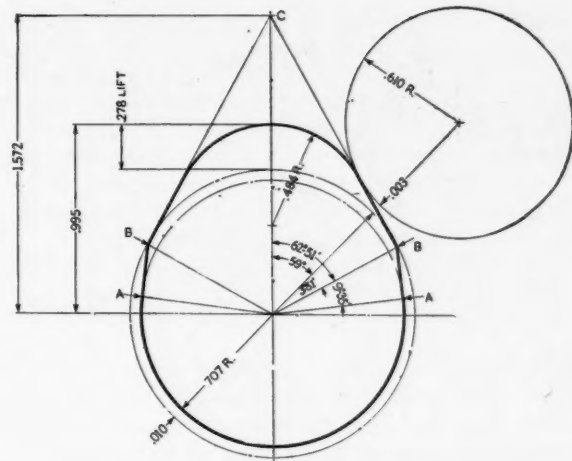


Fig. 8—Inlet and exhaust cam layout. AB and BC are straight lines intersecting at sharp angle at B

it possible to equip the engine with a 2-in. carbureter. The car accelerates well in cold weather, without using a choker, by the time it can be driven out of a cold garage onto the street. A manually operated valve is provided to force all the exhaust heat through the intake. This is used until the engine heats to the normal operating temperature, or it can be left on continuously without causing any harm except a slight restricted exhaust passage for high speed in this particular experimental design. The good acceleration while cold indicates super-heating of the fuel; in other words, it does not condense materially before reaching the cylinders, even when the engine is cold. When using the larger carbureter and developing correspondingly higher power at both low and high speeds, there is a smoothness in operation that never was obtained with smaller carbureters. The degree of flexibility, smoothness, economy and power are far in advance of the best previous results. The engine shows good torque, right down to the point of stalling. It is believed that even these preliminary investigations show that the conventional hot-spot method can be far surpassed and that the fuel can be heated without unduly heating the air. Here again the results obtained are a direct result of the change in viewpoint.

We will next consider tests showing the effect of a proper correlation of car and engine characteristics using 4.25 to 1 and 5 to 1 compression pistons in the same engine. First a brief description of the engine and testing apparatus will be given.

The Engine Used in the Test

The engine used in the test is a valve-in-head type with six-cylinders, $3\frac{3}{8} \times 5\frac{1}{2}$ -in. (295.2-cu. in. displacement). The cylinder block and upper crankcase is a one-piece casting of aluminum alloy, with inserted cylinder sleeves of cast iron machined all over. The cylinder-head is of cast iron and detachable. Fig. 7 shows a cross-section of the engine and gives a fairly good idea of the detailed construction. The crankshaft is of the three-bearing type and of liberal dimensions. The hollow crankpins are $2\frac{1}{4}$ in. in diameter and $1\frac{3}{4}$ in. long. The shaft is drilled for oil passage at 25-lb. per sq. in. pressure to all the main and connecting-rod bearings.

Attention is called to the unique cylinder-sleeve construction with particular reference to the application of the packing at the bottom of the sleeve. The sleeve at the bottom diameter has a snug slip fit in the aluminum case. The sleeve, however, has been shown to have a very slight axial movement here. This follows from the fact that the aluminum case is not subject to as great a temperature range as the cast-iron sleeve, the higher

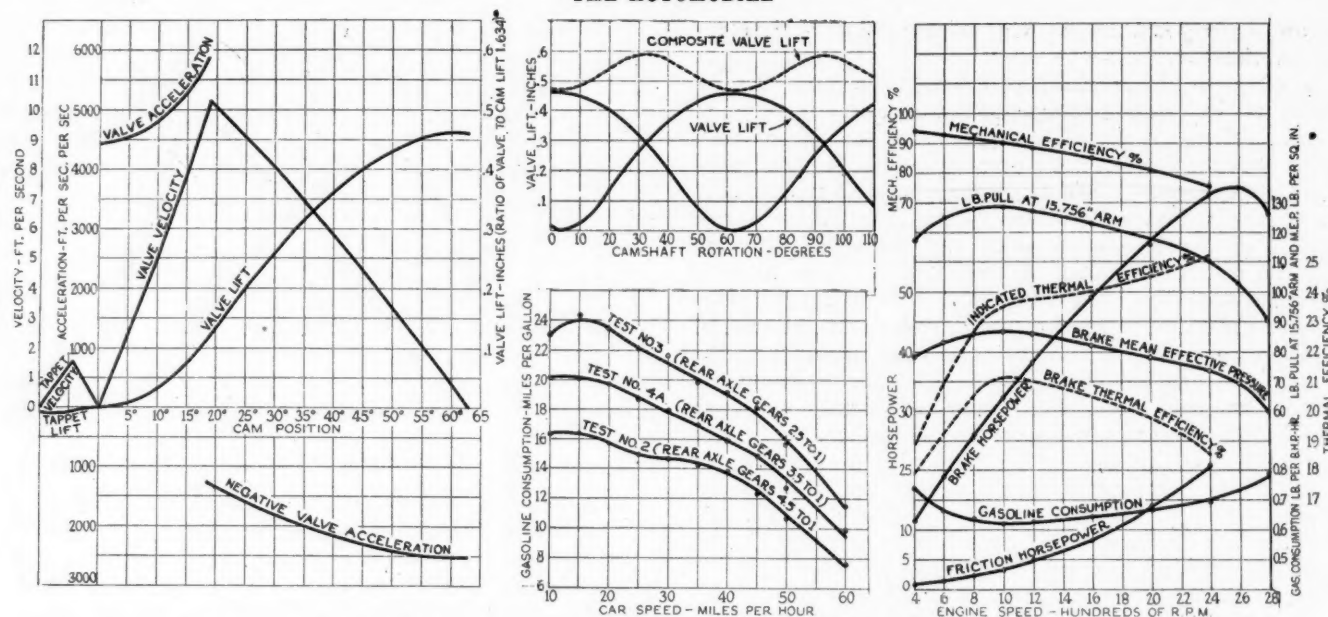


Fig. 9 (at left)—Characteristic curves of mechanism at engine speed of 3000 r.p.m. Fig. 10 (center, above)—Curves showing how inlet valves overlap in the six-cylinder engine used. Fig. 15 (at right)—Characteristic engine performance curves at full load. Compression ratio 4.25 to 1. Fig. 16 (center, below)—Curves showing relation between car speed and fuel consumption, with compression ratio of 4.25 to 1

coefficient of expansion of the aluminum being offset by the greater temperature range of the sleeve. The pressure on the combination cork and hydroil packing is in an axial direction only; that is, there are no radial components of pressure from the reactions of the packing to throw the sleeve out of round. This is the characteristic difference from other types of sleeve constructions and is necessary to make sleeve construction successful.

Fig. 8 gives the details of the inlet and exhaust cams, both cams being identical. This is a special type of cam* having a zero opening and closing valve velocity regardless of engine speed.

Fig. 9 gives the valve-mechanism characteristic curves for an engine speed of 3000 r.p.m. Attention is called to the design to obtain a high acceleration away from the cam and a low acceleration toward the cam; that is, the acceleration that must be produced by the valve spring to keep the roller following the round peak of the cam, the 0.484 in. radius shown in Fig. 8. The equivalent weight of all the accelerated parts considered placed at the valve is 0.7635 lb. The valve-spring pressure required at 3000 r.p.m. is 59.8 lb. per sq. in.; at 3200 r.p.m. it is 68 lb. per sq. in.; at 3400 r.p.m. it is 76.8 lb. per sq. in. Great care is taken to have the master cam ground to a true radius at the peak of the cam. If the cam generated has any bumps on the peak radius, it is impossible to obtain high-speed operation for two reasons. The irregularities set up synchronous vibrations in the valve springs and the accelerations are immensely increased, making the springs too weak. For instance, if the 0.484 in. peak-radius has waves on it of 3/16-in. radius, the acceleration is increased 116 per cent. These points are mentioned because they are absolutely vital to the successful application of the valve mechanism of the roller type to a valve-in-head engine operated at high speeds.

Fig. 9 gives the inlet-valve timing overlap. This diagram shows that although the inlet-valve is held open fairly late, the valve of another cylinder is close to its maximum lift, preventing a blow-back into the carburetor. The valve timing is as follows: Inlet opens 4 deg. past top center and closes 60 deg. past lower center. Exhaust opens

52 deg. before lower center and closes 4 deg. past top center.

Fig. 11 shows a diagram of the intake-manifold passages. These are cast within the cylinder-head, making them of the shortest possible length. The firing order is 1, 5, 3, 6, 2, 4; therefore, the flow of gas is continuous in both directions from the center. The average gas velocity at 3000 r.p.m. at manifold inlet is 181 ft. per sec.; just above the valve it is 192 ft. per sec. and at full lift of the valve it is 247 ft. per sec. The throat diameter of the valve is 1½ in.; the outside diameter is 1⅝ in.; the valve lift is 0.445 in. The area at manifold inlet is 3.39 sq. in. The tulip-shaped inlet-valve is used to lessen the resistance and keep the velocity of the gas as high as possible on entering the cylinder as an aid to turbulence.

Fig. 7 shows the exhaust-gas pipe between the two center cylinders. The engine is equipped with a Deleo generator and single breaker-point type of ignition, with automatic and manual spark advance. A Willard battery was charged during the tests and also was used for starting. Champion—Toledo No. A-63 metric two-piece plugs were used for all the runs. These plugs had much to do with the ease with which the tests were run. Only six plugs were used and at the end of the runs they were in perfect condition. This is saying a great deal for the spark-plugs, considering the high-compression pistons, power output and speed of this engine.

Fig. 12 shows the 2-in. Johnson Model B carburetor used. The air-valve spring and strangle tube were first worked out for the low-compression piston tests. The same parts worked out nicely in connection with the 5 to 1 compression pistons, with only a slight change of adjustment on the air-valve spring. Otherwise, in each set of tests, all adjustments were kept constant for both partial and full-throttle loads.

With the Sprague electrical dynamometer and the fine throttle adjustment, the proper load and speed were obtained readily.

The section at AA in Fig. 13 shows the equal distribution of the cooling water to the cylinder sleeves. The water goes from the pump to the tube inside the cylinder block. Two holes for each sleeve give a uniform distribution of the water. This keeps all the sleeves at the same temperature, an important feature for equal gas distribution and smooth running. The engine cooling

*A detailed description and mathematical analysis of this type of cam will be found in the 1917 S. A. E. Transactions, Part 1, pages 328 to 337.

water circulates through a standard radiator such as is used on the car. The radiator is cooled by circulating water from an outside source around the outside of the radiator; that is, the cooling medium is water instead of air as used in the car. However, since the water passing through the engine has the same resistance as in the car, it has the same temperature drop, for the quantity circulated is the same in each case. The temperature of the engine water is controlled very easily by this apparatus, and car conditions are duplicated. The temperature of the engine water outlet was kept at 150 deg. fahr. for all the tests.

Fig. 14 is a photograph of the connecting-rod, inlet-valve, exhaust-valve, piston-pin and the pistons. The connecting-rod length is 11 in., the weight complete with bearings is 46.35 oz. and the center of gravity is 2.60 in. from the center of the crankpin end.. Two pistons are shown at the upper part of the photograph. The one to the left gives the 4.25 to 1 compression ratio; the one to the right gives the 5 to 1 compression ratio and is of the constant-clearance type. At the bottom the latter piston is shown from a different angle. A set of 4.25 to 1 compression pistons of the constant-clearance type was not available for the comparative tests; however, $\frac{1}{8}$ -in. wide piston-rings were used in each case and the 4.25 to 1 compression pistons were relieved at the side in an endeavor to give the pistons approximately the same bearing area as the other pistons. The cylinder clearance given the low-compression pistons was 0.005 to 0.006 in. and that of the high-compression pistons 0.0015 to 0.0025 in. The weight of three $\frac{1}{8}$ -in. wide piston-rings is 1.82 oz.; that of the 4.25 to 1 piston, 13.52 oz.; that of the 5 to 1 piston, 18.65 oz.; and that of the piston-pin, 5.60 oz. The weight of the complete engine without the clutch is 660 lb. The weight of the complete powerplant, engine, clutch and transmission is 780 lb.

Testing Apparatus

A Weston tachometer was used to indicate the speed. This was checked repeatedly by a revolution counter

throughout the entire range of speeds used. The engine cooling-water temperature was obtained by a radiometer calibrated for the range used.

Particular care was used in weighing the fuel for each run. Two fuel tanks were used, one for a general supply and the other for weighing the fuel consumed in 120 sec. The time interval was obtained from the second hand of a watch and the use of a three-way valve connecting the two tanks to the carburetor. Both tanks were equipped with gage glasses so that the level of gasoline could be kept almost the same. This scale balances readily within $\frac{1}{100}$ oz., even when the rubber tubing connected with the fuel line is in place.

During the tests the windows of the laboratory were opened and the room temperature kept close to 65 deg. fahr. on all the runs. The average barometer readings for comparative tests Nos. 1 and 5 were 30.23 and 30.22 in. of mercury respectively. The gasoline used was Target brand, made by the Western Oil Refining Co. The weight of a sample gallon was 96.80 oz. and the heat value per pound was taken as 19,500 B.t.u. in the calculation of the thermal efficiencies.

Comparative Tests

Fig. 15 shows the engine characteristics at full load with the 4.25 to 1 compression ratio. The maximum brake mean effective pressure comes at 1000 r.p.m., with a considerable reduction at 400 r.p.m. due to the delayed inlet-valve timing. The maximum fuel economy is 0.613 lb. per b.h.p. per hr. The mechanical efficiency is very good at low speed but drops off rather fast as the speed increases. The peak of the power curve is at 2600 r.p.m.

Fig. 16 shows the results of tests Nos. 2, 4A and 3, in terms of miles per gallon for 4.5, 3.5 and 2.5 rear axle gear ratios and 4.25 to 1 compression ratio. It will be noticed that a material increase in mileage is obtained as the engine load factor is increased by changing the rear-axle gear-ratio.

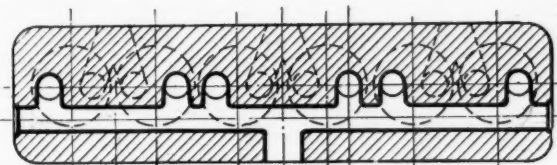


Fig. 11 (above)—Section of cylinder head showing short cast-in intake manifold

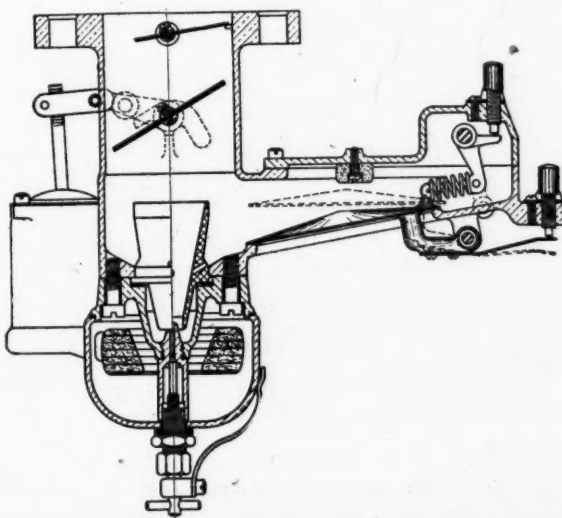


Fig. 12 (below)—Vertical section of 2-in. carburetor used in the tests



Fig. 14—Parts of engine used in test. Of the two pistons at top, the one nearer the center gives the 4.25 to 1 compression ratio, while that at the right gives a 5 to 1 ratio and is of the constant clearance type. Another view of the latter is seen at the bottom

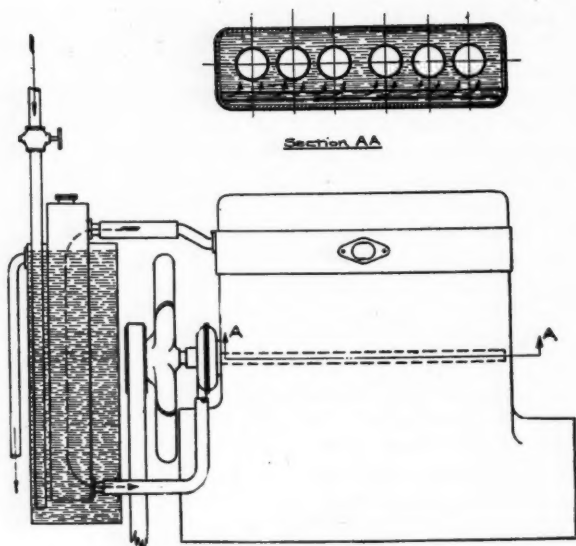


Fig. 13—Diagram of cooling water circulating system, showing method of cooling radiator used during block tests

Fig. 17 gives the engine characteristic under constant-speed driving conditions with 4.25 to 1 compression ratio and 3.5 to 1 axle gears. It will be seen that the full-load brake characteristics have been changed greatly, while the indicated characteristics have changed but little. The friction losses, which include the pumping losses, very materially lower the mechanical efficiency. Note that the engine is pumping against an intake-manifold depression of 15 in. of mercury at the lower speeds and the mechanical efficiency at 800 r.p.m. is only 58 per cent, compared with 91.7 per cent at full load.

Fig. 18 gives the engine characteristic when using the 5 to 1 compression pistons, everything else on the engine being identically the same. The readings given are not "snap" readings. The engine in all tests was kept running continuously and the results shown are those at which the engine runs with stability; that is, the result to which the engine settles at any given speed. It will be noticed that

the maximum brake mean effective pressure is still at 1000 r.p.m., but it has increased from 86.2 (see Fig. 15) to 96.9 lb. per sq. in. It will also be noticed that the increase is greater as the speed increases. The peak of the power greatly increased, being 0.527 lb. per b.hp. per hr. at 1000 r.p.m. as compared to 0.613 lb. per b.hp. per hr. in the case of 4.25 to 1 compression. The mechanical efficiency is not as good below 800 r.p.m., but it is much better at the high speeds, being 81.4 per cent as compared with 76.1 per cent at 2400 r.p.m. The maximum brake thermal efficiency is increased from 21.1 to 24.8 per cent.

Fig. 19 gives the engine characteristics at constant car speed, with 5 to 1 compression ratio and 4.5 to 1 axle gears. Fig. 20 is for 2.5 to 1 and Fig. 21 is for 3.5 to 1 axle gears. Fig. 21 can be compared directly to Fig. 17, the only difference being the compression ratios. It will be noticed that the mechanical efficiency has not been materially changed; however, the fuel economy has been very materially increased. It is very gratifying to note that the relative increases are even greater than those at full-load. At 1000 r.p.m., the brake thermal efficiency has been increased from 11.5 to 14.1 per cent, and at 2100 r.p.m. it has been increased from 16.4 to 23.2 per cent.

Fig. 22 shows the miles per gallon at various car speeds for 5 to 1 compression ratio. This can be directly compared to Fig. 16. The results are materially higher all along the line. The overall increase at 15 m.p.h. is from 16.4 to 31 miles per gal., when changing both the compression and the axle gears.

On long road tests the results agree very closely with the curves considering the amount of time the engine is idled and the nature of the driving. On the speedway the results can be duplicated at constant driving speeds. They can be further increased by using light engine oil and higher tire pressure than those used in the tests to set the standard of brake horsepower required.

Comparison of Results

Fig. 23 gives a comparison of the engine full-load characteristics. The comparison as a whole is entirely in favor of the higher compression ratio, but shows a very slight loss in mechanical efficiency below 800 r.p.m. The increase in brake horsepower is marked, especially at the higher speeds. The percentage increase in power ranges from

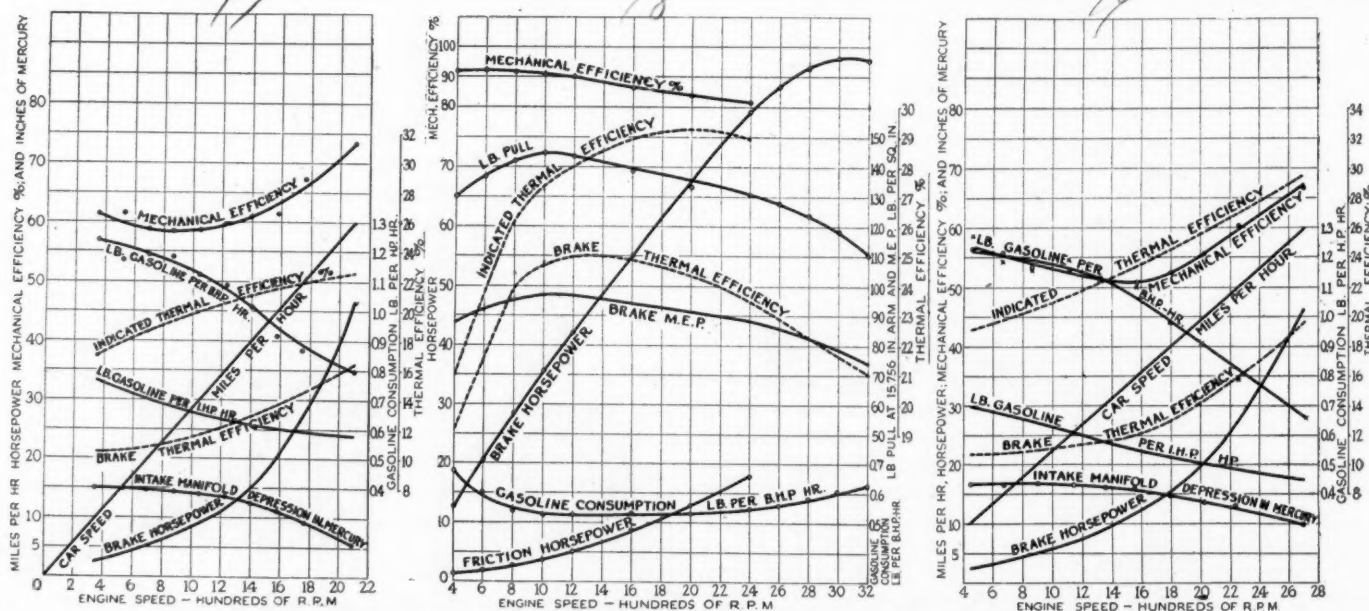


Fig. 17 (at left)—Characteristic curves of engine performance with 4.25 to 1 compression ratio when throttled to give power output sufficient to propel car on level road when using 3.5 to 1 rear axle gear ratio. Fig. 18 (center)—Characteristic engine performance curves at full load. Compression ratio 5 to 1. Fig. 19 (at right)—Same as Fig. 17 but using 4.5 to 1 axle gears and 5 to 1 compression ratio

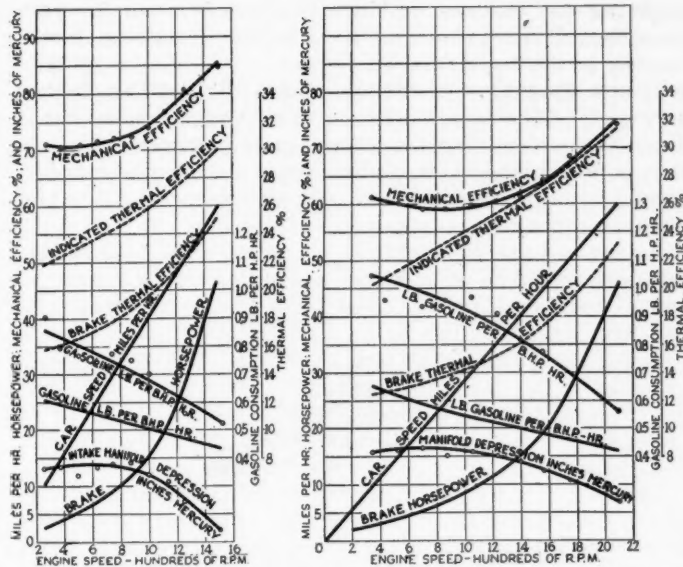


Fig. 20 (at left)—Characteristic curves of engine performance with 5 to 1 compression ratio when throttled to give power output sufficient to propel car when using 2.5 to 1 axle gear

Fig. 21 (at right)—Same as Fig. 20 but using 3.5 to 1 axle gears

10.5 at 400 r.p.m. to 37 per cent at 2800 r.p.m. The most important increase is that of the brake thermal efficiency. This ranges from 8 to 26 per cent.

Fig. 24 shows the result of increased compression ratio when keeping the rear-axle gears the same; namely, 3.5 to 1. The mechanical efficiency remains practically the same, due to identical engine speeds in each case. The increase in brake thermal efficiency ranges from 19 per cent at 10 m.p.h. to 41 per cent at 60 m.p.h. The saving in gasoline is from 16 to 28 per cent, and, at average driving speed, about 18 per cent.

Fig. 25 gives the comparative results of using the rear-axle gear ratios of 2.5 to 1, and 4.5 to 1, respectively with

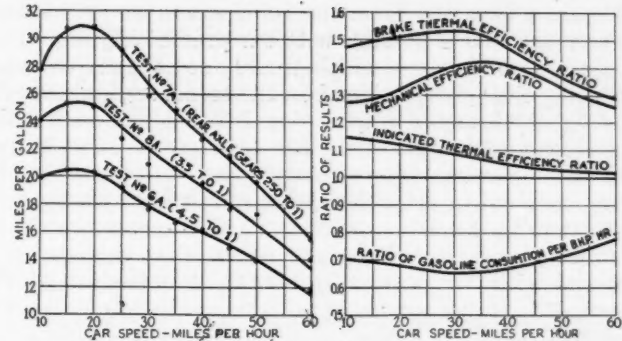


Fig. 22 (at left)—Curves showing relation between car speed and fuel consumption when using 5 to 1 compression ratio

Fig. 25 (at right)—Curves showing the effect of change in axle gear ratio from 2.5 to 1 to 4.5 to 1 upon fuel consumption, thermal and mechanical efficiency at various car speeds. Compression ratio 5 to 1

5 to 1 compression ratio. The percentage increase in mechanical efficiency is very marked; the maximum gain is 42 per cent at 36 m.p.h. At 10 m.p.h. it is 27 per cent and at 60 m.p.h. it is 26 per cent. The maximum increase in the brake thermal efficiency is 53 per cent, at 29 m.p.h. It is 48 per cent at 10 m.p.h. and 29 per cent at 60 m.p.h. The gasoline saved is 30 per cent at 10 m.p.h.; 34 per cent at 29 m.p.h.; and 23 per cent at 60 m.p.h.

Fig. 26 gives the percentage increase in miles per gallon in the case of using 2.5 to 1 axle gears with 5 to 1 compression pistons, as against the use of 4.5 to 1 axle gears and 4.25 to 1 compression pistons. The increase in miles per gallon is 70 per cent at 10 m.p.h.; 95 per cent at 20 m.p.h.; 81 per cent at 30 m.p.h.; 68 per cent at 40 m.p.h.; 76 per cent at 50 m.p.h.; and 104 per cent at 60 m.p.h. These are worth while increases in economy that cannot be passed by lightly, yet they are by no means as great as the economy that is possible. Let us next consider the economy that is possible even with our present engines. For the sake of a name let us call it the "ideal" economy.

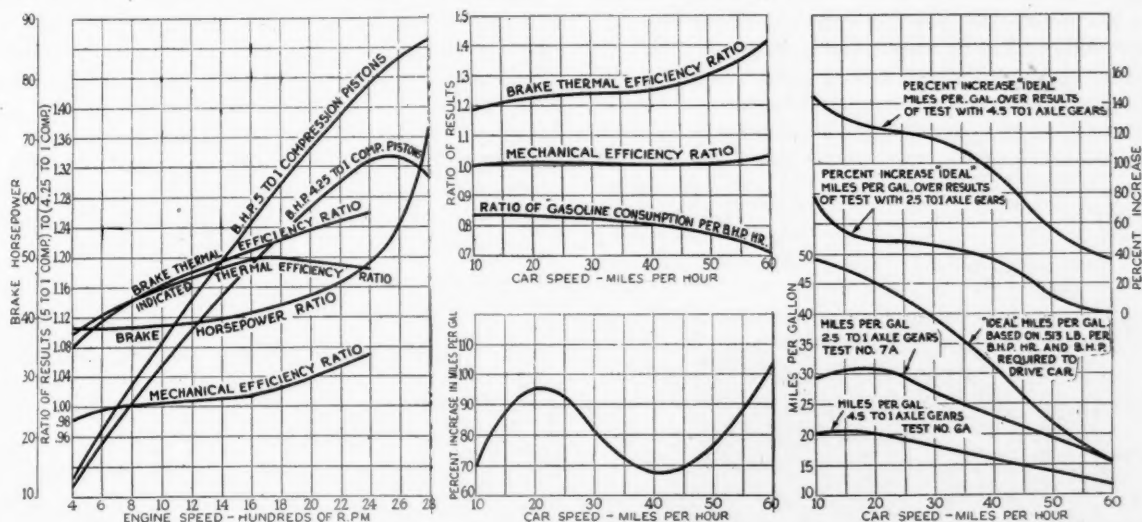


Fig. 23 (at left)—Curves showing comparative effect on engine characteristics at full load of change of compression ratio from 4.25 to 1 to 5 to 1

Fig. 24 (center, above)—Curves showing effect of change in compression ratio (4.25 to 1 to 5 to 1) on fuel consumption, thermal and mechanical efficiency at various car speeds, with 3.5 to 1 axle ratio

Fig. 26 (center, below)—Per cent increase in miles per gallon of fuel when using an axle gear ratio of 2.5 to 1 and compression ratio of 5 to 1, as compared to using an axle gear ratio of 4.5 to 1 and compression ratio of 4.25 to 1

Fig. 27 (at right)—Curves comparing economy possible under "ideal" conditions of gear ratio, engine size and load, with economy determined in test when using 5 to 1 compression ratio and two different axle gear ratios

We are a long way from the point where we utilize even the economy that is possible with our present engines. Fig. 27 gives a comparison which throws some light on what is meant. This chart is based on the actual engine economy existing at 60 m.p.h. when using 2.5 to 1 axle gears and 5 to 1 compression pistons. The economy is 0.513 lb. per b.hp. hr. Using this economy and the brake horsepower required to drive the car at each speed, we derive a curve that we have termed the "ideal" economy in terms of miles per gallon. It is not meant that this curve is practical with our present system of transmission of the power, but, if the proper gear ratio and engine size are used for any given speed, this economy can be obtained for the size of car used in these tests. From the ideal curve it will be seen that it is possible to get 49 miles per gal. at 10 m.p.h.; 45 at 20 m.p.h., 39 at 30 m. p. h., and 31 at 40 m.p.h. The comparison is made with the results of 2.5 to 1 and 4.5 to 1 axle gears, in connection with the 5 to 1 compression pistons.

The increase in the miles per gallon over that of the results with 2.5 to 1 axle gears is 76 per cent at 10 m.p.h. and 45 at 30 m.p.h. The increase over that of the results of 4.5 to 1 axle gears is 146 per cent at 10 m.p.h., 115 per cent at 30 m.p.h. and 36 at 60 m.p.h. Further, the ideal economy comparison with the results obtained from 4.5 to 1 axle gears and 4.25 to 1 compression pistons is an increase of 104 per cent at 60 m.p.h.; 163 per cent at 30 m.p.h., and 199 per cent increase in miles per gallon at 10 m.p.h. These figures certainly are emphatic enough to arouse several changes in viewpoint of our present methods of

applying our engines. Evidently there is room for very considerable progress and it is hoped it will be forthcoming in the near future.

Means should be developed making it possible to use very high piston compression ratios. It seems certain that it can be done and to great advantage in increased economy. It is hoped that very decided progress will be attempted in piston development with a view to overcoming knocking and increasing the general efficiency.

As engines are made smaller to increase the load factor, carbureters will be made larger to avoid pumping losses and loss of maximum power. The fallacy that large carbureters are not as flexible or as economical as small ones is based, it seems, on the failure of certain types of large carbureters which it is thought are working on incorrect principles. It is recommended that we try the plan of using large carbureters to operate small engines, rather than using large engines to operate small carbureters.

The possibility of securing higher mechanical efficiency should be studied from every angle. The tests show that an absurd waste is rampant in our present method. How far our ingenuity can go in this direction is hard to predict. One thing is certain, we must analyze carefully the gains that can be made. A close study from the brake-horsepower standpoint may justify changing both our transmission and our rear-axle drives. The latter combinations, together with engine developments, look the most promising at present. The progress we make undoubtedly will be measured by the extent to which we expand our engineering viewpoint.

New High-Priced Twelve

A NEW high-priced car, the Heine-Velox, is announced from the Pacific Coast, the manufacturer being the Heine-Velox Engineering Co. One of the chief aims in the design of this car was to combine a low center of gravity with a fair road clearance, to insure easy riding qualities, freedom from skidding tendencies and long tire life. The car has a 148-in. wheelbase and can turn in a 53-ft. circle. The floor of the car is only between 22 and 23 in. from the ground where the car is loaded, and the drive from transmission to rear axle is then straight.

The engine has 12 cylinders, and is built partly by the Heine-Velox Engineering Co. from parts supplied by the Weidely Motors Co. It is said to be the same type as used on the H. A. L. car. One of the power plant features is an oil cooler, a desirable asset for a car used in mountainous districts. The weight of the sport model illustrated is 4500 lb. The oil level gage is in plain view of the driver. The windshield is of the clear vision type,

without supports to obstruct the driver's view. The body is hung from the sides of the frame, instead of being suspended above it, and the floor is entirely inside the frame, making the top of the frame channels level with the top of the floor. The radiator front is in line with the rear side of the front axle. Four hydraulic brakes are fitted.

The instrument board and the brake and gear levers are placed in an unusual position, so that the driver can reach any part without inconvenience from his seat. The following instruments are used: oil pressure and oil level gages, Radi-meter, speedometer, clock, gasograph, ammeter, voltmeter, battery gage and altimeter.

This car will be furnished as a sport model, limousine sedan and racing runabout. The standard models sell at up to \$17,000, and special models at up to \$25,000. All bodies will be custom built in the Heine-Velox plant.



The Heine-Velox twelve with sporting type body

Muck-Raking in Demand

IT appears that the Danish Government has had the military flying service investigated by a committee appointed for the purpose, and that the latter is about to issue its report, concerning which some information has leaked out in advance. According to *Swensk Motortidning* the report will unequivocally condemn the whole service, which is declared to be unworthy of any consideration. One of the first steps taken was to forbid the use of all military aeronautic material, comprising about twenty planes, and the Commission announced that all the equipment would be destroyed, notwithstanding the fact that much of it has never been used. Severe criticism is also passed upon the construction of a flying field and the training of military fliers, which is regarded as quite inadequate.

What Place Has Individual Personality in Industrial Relationships?

It is often said of plants where excellent industrial relations have been obtained, "It all depends upon the personality of Mr. Smith; if he were to die, they would have as much trouble as anybody." This article discusses the various sides of the question, and presents helpful conclusions.

By Norman G. Shidle

THE industrial relations story of many plants has been written. Very often a successful achievement along this line seems to revolve almost entirely about the personality of a single individual. In such cases a study of the particular story may yield but meager material for adaptation in other plants. Remove that individual and nothing may be left to the industrial relations policy of that firm.

In the Endicott-Johnson shoe factory, for instance, if consensus of journalistic opinion is to be believed, the success of the industrial relations policy revolves chiefly about the lovable personality of Mr. Johnson. Remove that personality, and there is but little story to write. Saying that if the individual is removed in such a case nothing is left of the industrial relations policy, is not to say, however, that the policy would necessarily fall to the ground immediately he was removed. It might—but it might not. It is this question that calls for further discussion.

Because personality has played such an important part in the success or failure of a number of plant labor relationships, a thorough analysis of that factor will be of value. It must be recognized, and it might as well be analyzed and estimated at its true value.

Various plans for employees' representation and industrial democracy have been formulated and advocated for use in any plant. Such plans, however, must be administered; a personal contact must occur somewhere along the line between employer and employee, whether such a plan is in effect or not—and again enters personality.

Even where mechanical means for organizing a labor policy have gone the farthest, the success of the plan rests largely upon how the administration is carried out, which in turn depends upon the composite or individual personality of the particular management.

The Greenfield Tap & Die Company, for instance, has had an industrial democracy plan in use for more than a year. It is working successfully. During that time the management has never yet exercised its power of veto on any recommendation made by the employees' representatives. Only three times has the management returned to the employees' representatives recommendations, asking that those representatives reconsider the recommendation. In each case the management has sent along with the request for reconsideration a full statement of its reasons for asking that the matter be discussed again. Each time that this has happened the employees' representatives have discussed the statement of the management and withdrawn the recommendation.

Note, however, that the management has the power of final veto; it could have simply vetoed these measures

and that would have been the end of it. The method which it did use implies one sort of personality; the method that it could have used but did not, implies another sort. Had "the other sort" been in control the whole representation plan would probably have broken down before this. Personality, attitude of mind, habit of thought—whatever you may call it—plays a large part in industrial relationships whether in the person of a single individual or in that composite individual known to the workman as the management.

The constant and direct contact between management and employees, however, usually revolves to a large extent about one person; often the personnel manager. And it is through that man's personality that the management is reflected to the workmen. In the case of the Endicott-Johnson plant, it is through Mr. Johnson, according to reports. In the case of the White Motor Company, it is chiefly through one of the vice-presidents; in the case of the Filene store, through one of the vice-presidents; in the case of other companies through other individuals. The cases mentioned all involve companies which have been conspicuously successful in conducting the human relationships of their organizations.

The criticism of the policy of a plant which revolves so strongly around the personality of one man is that stated in the beginning of the article; if that man should die or be lost to the firm, the whole structure would topple over; it rests chiefly upon a personal adherence of the majority of employees to that one man. They love him, they respect him, they trust him, and admire him. If he goes, what becomes of the industrial relations policy?

The answer is fairly clear. It varies with different cases and may be divided in this way:

1. In some cases, the criticism given above is perfectly valid. The structure will fall to the ground when the particular personality leaves, because it has not only grown up around that personal adherence to an individual, but it is carried on upon the same basis.
2. In other cases, the man with this personality was necessary to start the work in the beginning. Perhaps the confidence and trust of the men has been built up on that basis. When that has been done, however, this man has been able to instil the same spirit throughout the management and executive organization until finally the composite "management" becomes an attractive and trustworthy personality to the employees. In such cases the work can be carried on without any diminution of success after the individual leaves.

(Continued on page 179)

Distributing Overhead Expense by the Machine Hour Rate Method

After describing briefly the four other methods of distributing overhead expense, Mr. Haigh shows in detail the advantages of the machine hour rate method. He believes that more knowledge of the expense element of manufacturing cost is obtained by this method than any other.

By Christopher Haigh*

AN interesting discussion of the methods of distributing overhead expense, with particular reference to the advantages of the machine hour rate method, is contained in the following paper presented before the American Gear Manufacturers' Association by Christopher Haigh, Supervisor of Costs, General Electric Co.:

There are five methods in general use for distributing overhead expenses. These are:

- Man Rate
- Man hour
- Sold hour
- Material and Labor
- Machine Hour Rate

The man rate method is the one in most general use, because of its simplicity. To use this method, it is only necessary to find the ratio of total expenses to total labor for a given business and to apply this ratio to the labor cost of each job. For a factory making one kind of product, this method of distributing overhead is quite satisfactory, but where the product itself is varied and the tools used in getting out the product are different for each of the various units produced, it is incorrect and misleading as to final results. There is no more justification for considering that one dollar's worth of labor actually applied to the product should always take the same percentage of expense than there is for the assumption that a lathe and a boring mill, which cost the same, are operated for the same amount and occupy the same floor space, or, further, that the overhead cost of maintaining benches and assembly floors is the same as the overhead cost of maintaining and operating machinery.

Defects in New Rate System

This method of applying overhead also assumes that the highest paid workman requires the most overhead expense, when actually the lowest paid man often requires the most supervision, and frequently the machine tools used by the low priced man are more expensive and require greater expenditures for operation and maintenance than those used by the skilled mechanic, because we incorporate in the machine which enables us to use lower grade labor the skill which the high grade man has in himself. Thus, if we design a semi-automatic machine for making any part, we can use a man who is not an expert mechanic to run this machine, or even several of these machines, but if we did not have this special equipment, we would require a skilled man in constant attendance on a more simple machine. It is obvious in this case that the overhead expense which is incurred in running the automatic

machines is much greater in proportion to the wages paid the operator of these automatic machines than is the overhead incurred in running the mechanical equipment required by the skilled mechanic.

It is also true that even if the same wages were paid all men in a manufacturing establishment, it would still be wrong to apply the overhead to each job on the basis of a percentage to labor, for we would still have the condition of one man running more machines than another and of the difference in cost of the machines operated; also, that some men would be occupied on jobs such as cleaning castings, checking finished product, painting, etc., which require little mechanical equipment, and therefore do not increase the overhead expense at the same rate as their wages increase the direct labor payroll.

From the foregoing remarks, it would appear that the man-hour rate method of distributing expenses is a very dangerous one and that all manufacturers who use this method are certain of losing money. Therefore, it seems to be necessary for me to say a few words showing where this method may give results which will be satisfactory from a standpoint of profit.

When Equipment Is Standardized

In a manufacturing establishment where the mechanical equipment is fairly well standardized, where the products, while varied as to different types, still have the same average types of output, and where these types all require substantially the same machining operations; it will be found that the ratio of profit to total output will come up to expectations when the man rate method of distributing overhead is used. There is also a factor which must not be overlooked when considering any business, and that is, the amount of information which the man or men at the head of it have of that business independent of records, as I have frequently found that when estimating cost of new work, allowances are made by the owner of the business for a higher expected cost of the new work due to special facilities which will be necessary and to the expectations that the bigger machines in the plant will be used on the work. By making such allowances, the final price submitted includes some of the factors of expense cost which are not actually subject to proof from any records of overhead expense which would be available if the man rate of distributing overhead were in use, but which nevertheless result in the inclusion of these extra items of expense in the selling price.

There is, however, a question in my mind, and I think in yours, as to how many men who manufacture a wide variety of gears can give the necessary weight to all the expense factors which will increase or decrease the cost of

* Paper read before American Gear Manufacturers' Association.

a particular kind of gear, and it is undoubtedly true that many of the manufacturers who are making good profits on their total business are losing money on some particular type gear because of their lack of knowledge of the operating cost of their machines. Also that they turn down business on which there may be good profit because their selling price is figured on the basis of the average overhead which brings the price up higher than the buyer will pay.

The Man-Hour Method

The man-hour method of distributing overhead has for its base the number of hours spent on a job instead of the amount of wages paid. This method is subject to the same criticism as the man-rate method in that the assumption is made that the overhead expenses have a fixed ratio to the number of hours of time spent on a job. The advocates of this method point out that certain items of expense do bear a direct relation to the number of hours worked, and include under this head the expenses of the payroll and welfare departments, toilet articles, compensation, insurance and supervision, and we can agree that to a certain extent these items bear a closer relation to hours worked than to wages paid, but as these items are a small part of the total expense, and as it would be erroneous to distribute the major part of the overhead on this basis, I see no advantage in this method over the man-hour basis. Moreover, it can be pointed out that we do not reduce our payroll and supervisory force every time business falls off to such a point that we lay off some of the men, and therefore, the cost per man-hour of operating these departments would fluctuate sufficiently to nullify any advantage gained over the man-rate method, particularly where this advantage consists mostly in compensating for the difference in labor rates by substituting hours worked for wages paid.

Material and Labor (Prime Cost) Basis

The application of overhead on the basis of prime cost (material and labor) is not in very general use so far as I am aware. This method requires that the total expenses of a business be divided by the sum of the direct labor and direct material, and that the ratio or percentage so obtained be applied to the direct material and labor cost of each job turned out. It is manifestly wrong to apply this method to the product of a business which uses various kinds of material, but, where the product is all made from iron or steel, this method has some good points, as, by taking the material into consideration as well as the labor, we apply more accurately the expense of handling the material in the shop which, of course, varies with the size of the piece handled. In a shop using both copper and iron castings, this method would be worse than the two previous ones, as by adding the value of a copper casting to the labor of machining it, we would get a total figure which would carry a very high amount of expense which, when compared with the expense cost applied to an iron casting of identical size requiring about the same amount of labor, would indicate that the expense cost of machining the copper casting was as much higher than that of the iron casting as the difference in the price per pound of copper and iron.

This method has many of the same kind of inherent defects as the man-rate and man-hour methods, as we would still be applying an average expense to jobs instead of an actual cost, the difference between this and the other two systems being only that the material is added to the labor before determining the expense to be applied.

Even were this method the correct method for some businesses, the places where it could be applied are limited in number, and this method can never be applied gen-

erally. It is mentioned here, however, as it has been pointed out to me that the steel gear business is one of the very few where this system could be applied, and while I do not advocate its use, as I see very little, if any, advantage over the man-rate method, nevertheless, I think it well worth while to mention the system in connection with other methods of overhead distribution.

The Sold Hour Plan

The sold hour plan of distributing expenses provides that we take the total direct labor wages in a department and divide this total by the number of hours worked in the same period to get a flat average cost per hour for labor.

The time in hours consumed on any job is valued at this flat rate per hour, and the result is called the direct labor cost.

The expense is applied on the man-hour method previously mentioned.

This method is not in very general use and little can be said in its favor. The man-hour method of distributing expenses has been criticized before and much need be said regarding the determination of labor costs under this plan unless the rates paid workmen were practically uniform, we would include still another error in our final cost by using an average rate per hour for labor.

There are still other methods of distributing overhead for special businesses, but because of their limited application, no mention is made here. I have written about the four methods covered so far in this paper to enable me to show the contrast between the results obtained under these methods and the results obtained by using the machine hour method, which follows:

The Machine Hour Rate Method

This method consists of distributing all the manufacturing expenses of an establishment by a charge of each job of the overhead cost of operating the machines and other facilities used on that job. This overhead charge is not an average charge for the whole plant or department, but is, as nearly as possible, the actual overhead cost of maintaining and operating each of the machines, group of machines, benches, etc., which are found in the plant. By the proper use of this method it is possible to show the difference between the expense cost of a boring still and a lathe, a gear cutter and a splining machine, etc.

The advantages of this system are well covered in several books written by A. Hamilton Church, and I think it would be of benefit to those of you who have not seen these books if you would obtain a copy, as in this paper I cannot go into all the details of the system, nor do I think you would want to listen to an explanation of details even if the time permitted, and yet, to thoroughly appreciate the advantages of the system or to realize its disadvantages, a fairly complete knowledge is necessary.

Method of Determining Rate

To install a Machine Rate Method, we would first find the number of feet of productive floor space available for manufacture, eliminating the space used for foremen's offices, stairways, wash rooms, etc. We would use the number of square feet so obtained as a divisor for determining the cost per square foot per year for maintenance, depreciation, taxes, insurance and other kindred charges applying against the land and building. We would not include any expenses in this group which were incident to the actual operation of the machines, but only those charges which applied against the empty buildings ready for manufacture. We would include, however, the expense of lighting and heating and building and charges of a similar character. In this way we get a charge per square foot which is practically the same charge which the owner of

the building would make if he rented it to us and furnished the light, heat and water used in the building, except that he would require a profit on his investment which we would forego in the expectation of making this profit on the gears which we manufactured.

Factory Divided Into Production Centers

We would next divide the factory into production centers, including in each center machines of similar character located together, or individual machines where there were no convenient groups. We would never include different kinds of machines in one production center, as this would defeat the object of this system. After the division into production centers has been made, we would determine the number of square feet occupied by each center, including in this area the space required for the material waiting to go on the machines, the space required for the workman, etc., and would charge each center with a part of the rental of the whole building based upon the area occupied. This division would give us the rent per year for each production center, and in this way we would allocate the total charges of the building which we have called rental charges to various production centers. We have now got one part of our expenses divided in such a way that we can include them as one factor in the machine hour rate.

We would next determine the actual cost of the expense items incident to the operation and maintenance of each of the production centers. These expenses consist of depreciation of the machinery and equipment, taxes, repairs, small tools, cutting oils and other charges which can be definitely allocated to the one or more machines which have been included in one production center. If a small group of machines, all included in one center, require the entire time of one foreman, the wages paid this foreman would be included with the other expenses in arriving at the total cost of operating the center.

The distribution of the power charge can best be made on the basis of the horsepower required by each production center. In this power charge we would include the expense of running the power plant as well as the shafting, belting, etc.

The expenses which we are dividing should cover a period long enough to insure correct results, and should cover a period of normal operations so that our results will represent the hourly cost of operating our production centers in normal times and under normal conditions. The best results are obtained if the expenses for a whole year are used as a basis for the machine hour rate, and if these expenses are carefully analyzed and allocated to the various production centers, the hourly rates first determined will not require much adjustment. In fact, the success or failure of the system depends on the amount of attention given to the division of the expenses at the start, as, unless the first rates are approximately correct, the first results obtained from the system will be so disappointing and misleading as to cause a manufacturer to condemn it and to insist for all time that the plan is no good.

A Detailed Analysis

For the purposes of this paper, we will assume that the expenses analyzed cover a period of one year.

We have now divided two groups of the annual expense among the various production centers, and by adding the rental charges and the charges for operating and maintaining the machines, we have the basis for determining the hourly cost of expense applicable to work on the Machine Hour basis. To determine the hourly charge, we must estimate the total normal hours which each production center will work per year; we then divide the

amount of the expenses allocated to each production center by the normal hours this center should operate, and the result is an expense cost per hour.

There still remain a few items of expense which have not been distributed, such as supervision, clerical and general administrative expenses. These expenses should be totaled, and this total divided by the sum of the normal hours of all the production centers. The result of this is another hourly expense cost which is to be added to each machine rate as a supplementary charge.

It must be brought to your attention that the machine hour rate is based entirely on the assumption that the production centers will work a certain number of hours in a certain time—a year having been used as the basis of this discussion. It is obvious to all of us that no man can predetermine accurately the number of hours any machine in his plant will be occupied, and many people reject the idea of installing this system for that reason alone. I think you will agree, however, that either by keeping records, or examining records already available, a close approximation of the normal working time of any machine can be found, and if the expenses of operating the machine are based on an approximately correct operating time, we have, by the machine hour rate method, a means of showing immediately the financial effect of any variation of the operating time of the machines from the predetermined normal or standard operating time.

In making up the hourly rates, we assumed that we had a certain amount of expenses, say \$1200, to absorb in a certain period, say one year, over one production center. Let us say that we estimated that the normal hours that this center would be used in the year were 2400, or 200 per month. On this basis, the hourly expense cost operating this production center is fifty cents. By adding fifty cents for each hour that a job required the facilities of this production center, we would expect to absorb all the expenses connected with it. Now, if the jobs passing through this center in a month required the use of the facilities for only 180 hours, we would see at the end of the month that on this particular center we had failed to absorb \$10 of our expenses. We would have the same information for all other centers and, therefore, for the whole shop, and would know at the end of the month how much of the manufacturing facilities had not been used or had been used more than we expected, this information being available both in terms of hours and money.

Supplementary Rates

It is not, of course, expected that any manufacturer would absorb all of the differences between the amount of expense actually absorbed and the amount which he expected to absorb, and to insure that all expenses are included in cost, a supplementary charge is made to each job to liquidate the amount of expenses which has not actually been absorbed through the machine rate in use.

This supplementary rate is a part of this system of expense distribution and is, in fact, a valuable factor because we know from the amount which we add to cost to absorb these supplemental charges, how far from normal the plant is running. In fact, one of the great benefits of this system is that the supplementary rate soon shows if machines are idle because the expenses which would be absorbed by machines which had work to do become, when these machines are not in use, a part of the supplementary charges, and the fluctuations in the monthly amounts liquidated by means of this charge show to a great extent the efficiency with which the facilities of the plant are being used.

It will be evident to you, if I have been successful in showing you how the manufacturing expenses of a business are distributed by means of the machine hour rate,

that this method allows of a very close knowledge and control of overhead expenses, and that by this system we can obtain actual costs of each job.

When comparing the way in which expenses are distributed through the use of machine rate costs with the distribution by means of any other method, it will be seen that, as far as accuracy is concerned, everything is in favor of the machine rate method. In fact, I think the claims of its advocates, that this method is the only safe and scientific way of expense distribution, must be allowed. All other methods of absorbing manufacturing expenses depend in one way or another on averages, and yet there is no more reason for averaging the expenses-over costs of all the work produced than there is for averaging the material items.

I mentioned at the beginning of this paper that I was opposed to the application of any system to a manufacturing business which did not result in an increased knowledge of that business, and, through this increased knowledge, to a certainty of profits. I think that no one can, or desires, to refute the statement that more knowledge is obtained of the expense element of the manufacturing cost through the machine hour rate method than can possibly be obtained through any of the other methods used in business.

I am sure you will also agree that any of you who has this knowledge would use it to determine what business to take and what to refuse. If you were given the opportunity to bid on an inquiry for gears which would require your biggest machines, you would certainly make your price such that your expected profit would actually be

profit on that particular job, and would include in the cost on which this profit was based the actual overhead expense of the mechanical equipment to be used. If your price, assuming that your profit was reasonable, was such that you lost the order to some one who was quoting a price based on an average overhead, you would feel perfectly sure that this other concern was taking business at a loss and would be willing to let them have the order. Conversely, there are many jobs which require less machinery and cheaper equipment, and your method of arriving at costs would allow you to take this kind of business at a price lower than the concern whose costs were not accurately determined.

I believe that the reason this machine rate method is not in more general use is because of the amount of work which is required in getting the system working, and the extra bookkeeping involved in keeping the records which must be available if this plan is followed. Most manufacturers have an objection to increasing the administrative expense of their business and would rather spend money for new machinery than for a system of records. This attitude is certainly correct if there is no doubt that the business as run without these records brings satisfactory profits and will continue to do so, and if the new machinery earns its keep, but in any business which is to any large extent competitive, the need for accurate records will sooner or later be felt, and I am firmly convinced that those concerns which have the best system of cost records will be in existence long after the manufacturer who figures his cost on the hit or miss method has gone out of business.

Sufficient Spare Parts a Necessary Feature of Proper Tractor Service (Utilitor Service System)

A TRIP through a prosperous Eastern agricultural section shows that tractors are being bought. There is little indication, however, that they are being sold," writes Donald Blanchard in a recent issue of *Motor World*. And again, "Service sells satisfaction and satisfaction sells tractors." The vast importance of proper service as an adjunct to sound tractor merchandising is becoming more widely recognized among tractor manufacturers every day.

In the case of any particular tractor there is, within certain limits, a comparatively fixed number of parts which it is highly desirable for the dealer to carry in proportion to the number of tractors to be serviced in his territory, in order to render rapid and efficient service, while still investing in parts the minimum amount of money.

The dealer is not always willing or able to take the trouble necessary to determine in a scientific way just what his approximate inventory should be. Because it is to the manufacturer's advantage that the dealer should have such an efficient inventory, however, many tractor manufacturers have studied the matter carefully and are giving their dealers the benefit of their investigations; in some cases even requiring that a certain fixed supply of parts be sold to the dealer with each tractor that he orders.

The Midwest Engine Company, manufacturers of a very small tractor, the Utilitor, is paying particular attention to the service features of its merchandising policy, and has developed some excellent practice along this line.

When a new distributor is signed, a letter is immediately written to him by the service director for the purpose of making his acquaintance, outlining to him the service ideals of the company, and welcoming him to the organization. Particular care is used to impress upon the distributor the necessity for carefully inspecting the tractor before he ships it to a dealer.

The number of each of the various spare parts necessary to properly service any given number of machines has been carefully worked out. Every distributor and dealer is required to accept a certain quota of spare parts with each machine.

The quota is so worked out that when a distributor or dealer has received three carloads—or 90 machines—he has on hand a small stock of each part which goes with the machine. With the first group of machines go those parts which are likely to need replacement soonest. When 90 machines have been received by the distributor or dealer, however, he has a sufficient variety of parts to build an entirely new tractor.

The allotments for these quotas have been made up by the factory service department on the basis of field data and a long series of careful experiments. The manufacturer requires that the stated quota of parts goes forward with each order of machines, and distributors are required to make a like demand on the dealers.

In this way the factory is certain that from the standpoint of spare parts, at least, adequate service can be rendered to every user of its product.

What Has the Manufacturer Done to Disturb Dealers?

History is of value only as it supplies a background for the making or un-making of precedents. This article deals with two closed incidents—the allotments of cars and “drive-aways.” These incidents are important only as they indicate whether the manufacturer profited in the long run.

By Clyde Jennings

WE believe that it was fairly well established in a previous article that there is some existing discontent in the ranks of the dealers. In fact, we do not believe that any one will contend very strongly to-day that the automobile sales family is entirely harmonious.

It would be interesting, no doubt, to know just why this state of affairs exists. Perhaps you will recall that in the statements from dealers which were printed in the previous article that one dealer—No. 11—mentioned the fact that there was a charge of \$15 a car for national advertising that the dealer was compelled to pass on to the buyer. That is one indication as to the direction of the wind that blows on the coals of discontent.

But last spring we were hearing much about the allotment of cars. We don't hear so much about this now, but how do the dealers feel about it? This was one of the questions put to a list of dealers by a man who is on the closest terms of friendship with them. Thirteen dealers answered and—

Not a single one of the thirteen defended the factory, without reservation.

Do you get that? Not a single YES to the question:

Have the factories played square in the allotment of cars?

We are passing on to you some of the answers. Not all of them will be printed, for they get just a bit monotonous. Some of each shading will do. The first three are especially severe (on the manufacturer). If I was a manufacturer and one of my big distributors would say these things about me, I would be inclined to worry somewhat. Read them and see what you think:

1—No, they have not. A good many factories have men high up who have stock in distributing agencies and they have furnished these agencies cars first. Then distributors on the ground got next preference. We distributors without a pull who stayed at home got only what was left.

2—Our factory, I know, has not played square in the allotment of cars. Some of the larger distributors have received freight shipments when other dis-

tributers have had to drive their cars all last winter and this spring.

3—The factories have not played square in the allotment of cars.

Here are several of the moderate answers. The details of these answers are so much alike that some have been shortened somewhat, but the wording of the part passed along has not been changed. These answers are interesting:

4—Factories have played square only so far as they got full payment for their goods at factory door or could readily obtain equipment for shipping.

5—As far as I can find out, our factory has given as cars pro rata to the number they manufacture, but we have always been very suspicious. I know of numerous dealers and distributors who have got very rotten deals along this line.

6—Our factory has played square with us and the dealer on the ground with the money has not been shown preference. I have reason to believe, though, that some distributors have not been so well favored and that preference has been

shown in some instances.

7—The live-wire distributors who have had drive-away crews at the factories with instructions to take the cars as they came out of the doors and drive them away naturally have been favored.

8—I do not believe that all of the factories have played quite fairly in the allotment of cars. It is a fact that some of these factories have shown a decided preference to the dealer who was on the ground with sufficient money to take the cars and drive them away.

The previous article said that the dealers quoted are among the very best. Here is the proof of that statement. These dealers come in the class of “live wire”

business men, and, of course, they were the men who had men at the factory doors with money. In the following replies it is interesting to see how they justify this distribution.

9—Factories have not done in all instances what they should have done. We assume that they have done what most of us do—have taken the line of least resistance. There is no question in my mind but what a great majority of the factories have given preference to the man who has camped on the factory doorstep with the cash in his pocket when deliveries were bad.

10—As a general rule, it is my belief that the factories have endeavored to play fairly with the distributors and dealers. In answering this question it is, of course, necessary to take into consideration that we are all human and the factories, undoubtedly, to some extent like ourselves, the distributors, have given some consideration to the man who has been persistent to the point where we have, in some cases, given him automobiles to relieve his pressure. No doubt, the factories have in some cases done likewise.

11—Generally speaking, our factory has been very fair with us on monthly schedules, our increase this year being at a greater proportion than past showing would entitle us to. As to the day-by-day deliveries, however, I have known of some instances, personally, where dealers and distributors got cars to which they were not entitled. Also, nearly every time that Mr. Blank has gone to the factory he has succeeded in getting cars, whereas it was impossible to get them by correspondence.

12—I believe on the whole that the factories have been square in allotting cars to their dealers. The trouble with that lies in the fact that some of the largest distributors such as New York, Cleveland, Chicago and so forth, have been allotted larger proportionate contract allotments than the smaller points.

There is just one more reply that will be quoted. This man is very careful to speak for his factory only. It is the only real defense of a factory noted in the correspondence that is being quoted:

In so far as our company is concerned, I can truthfully say that in my opinion the factories have been absolutely square with us in relation to allotment and I do not believe that any other distributor with ever so much more money than we may have and by virtue of being on the factory doorstep can get any more cars than we can. Our factories have sold me on the fact that they are treating us all right.

If I was an automotive manufacturer I would insist that this dealer remain in my organization.

We all know that one swallow does not make a summer, and that one point of discontent would not make for a seriously discontented dealer world. Last winter and spring we were hearing a good deal about freight charges and drive-aways. As this is to a large extent a closed incident, we thought it would be interesting to sound out the dealers and hear how they felt about it. If one can judge by the general tenor of the following replies, some of the dealers are inclined to be a bit sore on this question. Some of the dealers are located so far from the factories that drive-aways did not enter into their operations, but nearly all replied to the question directly. The question was:

In view of drive-aways, factories were not put to the expense of loading, blocking, etc. Was there any dealer credit allowance made as a consequence thereof?

1—Some of the factories have more than offset this by putting the cars in proper condition and filling the tanks with gasoline. This has been true with the Blank people, for instance. Other factories have made a common practice of doing nothing and putting in a small amount of gasoline, probably five gallons, and letting the dealers shift for themselves. These factories, therefore, have saved a great deal of money for themselves by so doing which, of course, is an injustice.

2—Factories have never made any credit allowance for drive-aways.

3—Factories have made no allowances on drive-aways. Have grabbed the money and paid no part of shipping expense away from factory—supplied no blocking and made no allowance.

4—The manufacturer has been giving the dealer enough gasoline to take him to the first filling station and it would insult him if you asked him for any credit allowance because he had to do no loading or blocking.

5—No factory has, so far as I know, made any allowance or credit for the money they saved in loading or blocking cars.

6—So far as my knowledge extends, no factory has made any allowance to distributors for driving, loading or blocking.

7—The factories have not made allowances to the dealer wherein they saved the expense of bolting, blocking and so forth on drive-aways.

8—No allowances have been made in the case of drive-aways, so far as I know.

9—Our factory has not made an allowance of five cents for drive-aways although it has saved thousands of dollars in blocking material and labor charges. They have made in return a fixed charge of so much per car for getting cars ready for drive-away. In other words, they have added on an additional profit for themselves.

10—We are charged for decking for each car as shipped at a fixed rate. No charge of this kind is made on drive-aways. Of course, no allowance is made but none would be coming if the charge is actual cost.

11—We have never received any credits from our factories in lieu of loading expense on drive-aways. Two of our factories furnish a liberal supply of gasoline and have the motors completely filled with oil. The third factory makes a small drive-away charge. I believe that cars made ready for drive-aways have to be a little more completely equipped and inspected than for shipping, and it has been my thought that the cost of loading saved in drive-aways was pretty well absorbed by the additional work necessary to get cars ready to drive them away.

There is one fine thing about the answers to this question. That is the unanimity of opinion, and the short, sharp method of expression. Some of these answers fairly cut. The manufacturer can hardly be in doubt as to the impression left on the distributors' minds by this incident.

Bureau of Standards Annual Report Shows Extent of Automotive Research

Growing importance of the Bureau's activities to the automotive industry made apparent. Work includes research on carbureter and vaporization problems, materials of construction, storage batteries, spark plugs, etc. Much progress made in improving methods for testing lubricants.

IN the annual report of the Bureau of Standards, recently issued there is given an outline of the research work on problems connected with the design and operation of internal combustion engines which the Bureau has completed or has in contemplation. The variety of work done of an automotive character shows the growing importance of this Government bureau to the automotive industry.

According to Dr. Stratton, specifications for starting and lighting batteries have been prepared, at the request of the Motor Transport Corps. The effects of various factors on the voltage required to produce a spark at the terminals of various types of spark plugs under operating conditions have been determined. The results of this work are of special importance in providing for reliable ignition on engines operating at high altitudes with a supercharger.

A special research was undertaken to determine definitely the cause of occasional failures of ignition in aircraft engines apparently due to faulty spark plugs. The results were to demonstrate conclusively that early ignition of the cylinder charge due to overheated spark plug terminal was the cause. Types of construction which tend to aggravate or to prevent this effect were determined. The cylinder pressures resulting from such preignition were also shown to be some three times normal pressures and to constitute an enormous accidental overload on the engine parts.

The Bureau of Standards makes it clear that its researches into antifreeze solutions for automobile radiators are necessarily incomplete, but so far none of the materials submitted warrants the recommendation of solutions other than alcohol and water.

The laboratory for research on carbureter problems has been used for tests of a number of carbureters, including the following: White Co., Browne, Mitler, German Zenith (from German motor truck) U. & J.

A mathematical analysis of the laws of flow involved in one method of compensating for the effects of change in air density at altitude has been completed. Similar analyses of other methods are required.

The fuel economy and power of an internal combustion engine depend upon the condition of the mixture as regards temperature, vaporization of fuel, degree of mixing, etc. An investigation of this problem has been in progress.

Essential to this investigation is a knowledge of the vapor pressures and vapor volumes of the customary fuels. Apparatus for measuring these quantities has been in use for some time and results have been obtained on a number of fuels.

The carburetion research has been undertaken mainly at the instance of the Air Service and of the National Advisory Committee for Aeronautics, but some features

of it are of equal interest to the manufacturers and users of all types of automotive appliances.

The Motor Transport Corps has requested the Bureau to study the quality of the materials used in the construction of a large number of German motor trucks.

At the request of a maker of 6-throw automobile crank shafts the process of manufacture was studied with the idea of eliminating certain difficulties which had been encountered.

During the year physical tests were made on 1,193 samples of oils and greases. This very large increase in work, as compared with previous years, was principally, if not entirely, due to the great number of samples received from the War Department.

The development of a lubrication laboratory with special reference to study of lubrication problems in automotive engines was begun in 1918, hence much of the time has been devoted so far to the development of apparatus and methods.

A series of tests were run in a typical aeronautic engine to determine, if possible, any difference in lubricating value of oils from different classes of crudes. The results showed no significant differences between properly refined oils from different sources, provided the oils are chosen with equal care to meet the conditions of operation.

A series of routine laboratory tests was run on samples of all trade-marked oils sold on the market and which could be secured by the Bureau. The results will serve as a guide to purchasers of oil and it is hoped will be of much value when published in the near future.

A new method of distillation has been perfected for the analysis of lubrication oils, which has proved to be of great value. By the use of superheated steam at very low pressures, in a special still, it is possible to fractionate ordinary lubricating oils and determine their composition with, in most cases, a negligible amount of decomposition. This process gives promise of important applications in the refining of oils.

Other problems which have been undertaken are (a) the relative effects on different classes of oils of dilution by fuels escaping into the crankcases of engines, (b) the extent to which fuel vapors are dissolved in different classes of oils. No significant differences between oils in these respects were found.

The tendency of oils to form so-called carbon deposits in engine cylinders has been investigated to some extent during the year. Further investigation of the oxidation test and the demulsibility test developed by the Bureau has been made in this connection.

Tests of 25 commercial brands of automobile oils were carried out in co-operation with one of the large automobile manufacturers. A number of special types of automobile oils were also tested for the inventions section of the War Department.

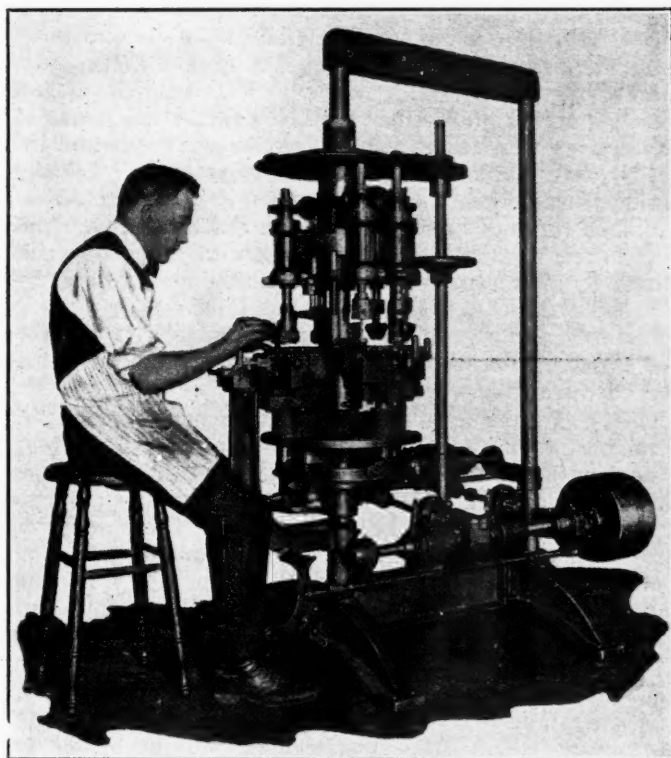
Owing to an unavoidable delay in the delivery of dynamometer equipment no progress was made in the investigation of power losses in tires. The apparatus which is now available will be used in a series of tests to be made in co-operation with the Motor Transport Corps and the Society of Automotive Engineers. A study will be made of different types of tires and of tire fillers under definite conditions of speed, load on tire, and power transmitted. The results of this research will be of particular interest to tire manufacturers in view of the necessity for reducing to a minimum the energy dissipated in tires, which often causes a rise of temperature sufficient to produce serious injury.

The Bureau has co-operated with the American Metric Association in recommending and promoting an international standardization of tire sizes. The importance of such standardization was brought out very clearly during the war, when it was found necessary to change the wheels on some of our motor cars in order to permit the use of tires manufactured abroad.

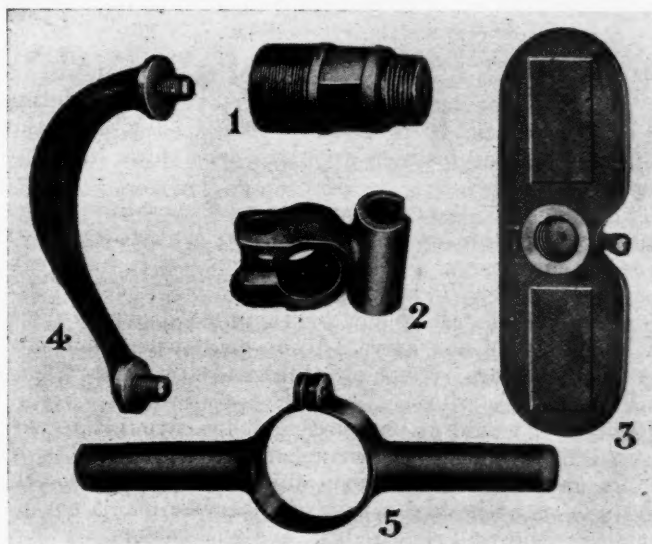
The Bureau has co-operated with the Air Service of the War Department in the development of specifications for leak-proof gasoline tanks and rubber shock absorbers, and in the production of a satisfactory rubberized silk fabric for diaphragms used in connection with autographic instruments.

A Vertical Automatic Chucking Machine

A VERTICAL automatic chucking machine with four duplex automatic chucking vises and three pairs of working spindles is being built by the Long Henkel Mfg. Co. The machine, known as Type B, is best adapted to work requiring (a) turning to size, (b) drilling or boring, (c) threading or tapping. It is claimed for this machine that it produces more work than other machines suitable for similar operations. The chucking vises automatically



Long Henkel vertical automatic chucking machine



Samples of work done by the chucking machine. Operations include turning, facing, drilling, threading and tapping. 1—Pump nipple. 2—Battery terminal. 3—Pump base. 4—Door handle. 5—Pump handle

eject the finished article, and after the operator puts the unfinished article in place, the vises again close automatically, thus relieving the operator of everything but the mere handling of the castings and observation of the work. The machine has positive drive and is equipped with ball bearings. All work is in full view of the operator.

The machine is not limited to simple operations. Multiple operations can in many cases be performed with the same setting, as, for instance, drilling different sized holes, tapping with different sized taps and various other operations limited only by the number of spindles that can be used. A magazine feed can be applied when the machine is used for threading or tapping bolts or nuts.

Individual Personality in Industrial Relationships

(Continued from page 171)

3. In still other cases, the whole structure of industrial relationships is built up from the beginning simply on a basis of fairness, honesty, and ordinary business goodwill between management and men. In such cases individual personality plays a small part.

Under any circumstances, however, the personality of the man who is to be the connecting link between management and men must have a personality that is attractive to the majority of the workmen. He must be able to sell himself to them. If he is not able to do this, he is not the

man for the job, regardless of his other qualifications.

Personality may as well be recognized at the outset as a potent factor in the success or failure of an industrial relations policy. It does not do to discount it. On the other hand, it must not be depended upon to do the entire work. Other practical factors must be back of it.

And above all, sincere pleasing personality must never be confused with the "glad-hand." The former is a real diamond; the latter paste—and not even a very good imitation.

It Costs Less to Hold a Customer Than to Get a New One

Here is an unusual analysis which shows the importance to the manufacturer of the factory service manager and his policy. The general manager of a motor car factory asserts in this article that the service department has obligations and can be of great value to the factory.

By George C. Hubbs*

IF it were true in the early days of the horseless carriage that service men were obliged to think in terms of mechanics, it is equally true to-day that the highest grade service men are those who think in terms of personality.

This change of thought has been made possible by the tremendous strides which motor car engineers have made in car design and construction, and it has been made necessary by the fact that to-day, with over 8,000,000 cars in the hands of owners, there are probably from ten to twelve million drivers to be dealt with, each one presenting a more or less different and difficult problem in personality.

Perhaps it would not be putting it too strongly to say that the handling and repairing of the temperaments of owners or drivers has become quite as much of an art, and quite as necessary a part of a service man's equipment, as is the skill required to repair their cars.

If this is true, then a service manager of a motor car manufacturer finds himself occupying the new and exacting rôle of service educator to the trade with respect to matters of conduct, diplomacy and honorable dealing.

Inasmuch as the owner-clientele of most dealers is very much larger than the number of new purchasers in any one year, it is perfectly obvious that upon the service manager rests the major responsibility for re-orders, for no fact is better known in this business than this: That the probability that a motor car owner will rebuy the same make of car is almost exactly proportionate to the character of service received from the dealers' service departments.

No manufacturer can dodge the responsibility for doing this educational work—nor should he want to. Certainly if he is going to fix the general sales policies for his dealers (and every manufacturer properly considers this his prerogative), then he should also participate in the larger and more difficult task of establishing a uniform standard of service conduct in the service departments of his dealers.

It has always seemed to me that sales and service policies should have their source with the manufacturer, and that the manufacturer is in reality responsible for the satisfactory or unsatisfactory experience which the individual owner may have with the manufacturer's dealers wherever the owner may have occasion to need sales or service help.

I am disposed to go so far as to say that in my opinion the manufacturer's service manager is responsible for both the efficiency and the behavior of every service employee in a dealer's establishment.

Such supervision is distinctly a protecting measure in the interest of the manufacturer's future business, and as such is well worth all the effort and expense it involves. Entirely aside from its effect upon current business, no manufacturer can hope to create those indefinable, but invaluable, assets known as confidence and prestige, unless he fortifies himself against that class of service men who seem to think that brusqueness and incivility are evidences of super-competency. In the hands of such men, a manufacturer's good name—established through great pains—is in real jeopardy. And if so, then it is his clear obligation to forestall such danger by giving his service manager the utmost latitude in prosecuting his educational campaigns.

I have spent a good many hours talking with service men about the necessity of being gentlemen (and amiable ones) before they were mechanics.

This, I am fully aware, requires an immense amount of work, inasmuch as many mechanics are more competent to deal with the weaknesses of machines than with the weaknesses of men. Machines are at least amenable to reasonable treatment, which is more than can be said of some humans. Nevertheless, these humans are the manufacturer's customers and it is the duty of the manufacturer to guarantee to them at least fair and courteous treatment.

It should also be borne in mind that, in addition to the fact that the manufacturer receives ample compensation in reorders and prestige from well-cared-for owners, the information which properly organized service brings to the engineering department would, of itself, more than pay for the cost of intensive service supervision, which introduces the service manager in two additional rôles—that of assistant sales manager and of assistant chief engineer. (And it takes a broad-minded sales manager and an open-minded chief engineer to fully appreciate the possible value to both of them of a highly efficient service manager.)

The real fact is, the service manager is the only executive of a motor car company whose value to the organization increases in almost exact ratio to the number of cars in the field, but this usefulness can be measurably added to by maximum co-operation on the part of the sales and engineering staffs. The service department is (or should be) emphatically the best business insurance policy any manufacturer can have.

*General Manager Grant Motor Car Co. Paper read at meeting of Factory Service Managers' Division of N. A. C. C.

Whether the repeat orders for a car run to 25 or 75 per cent of any year's output is a matter of distinctly major importance; and it must be undeniable that the service manager, by his thoroughness, or lack of it—by his vision of himself as a mere "trouble-shooter" or as an educator—is in a position to determine this percentage more certainly than can the combined efforts of the sales and advertising departments.

Furthermore (and it is not unimportant), it costs less to hold a customer than it does to get one. Also, the influence of a friendly owner is more helpful than the comments of a dissatisfied ex-owner.

The future of the motor car industry now lies largely with those who already own cars, so that the competition of the future will more and more concern itself with

comparative service, that is, until such a time as faulty human beings can build cars without incorporating in them their own frailties, and thereby make service managers unnecessary. If the truth must be told, cars are good in proportion to their ability to keep away from service departments, but so long as they are neither fault-proof nor fool-proof, the character of service their owners receive will continue to determine how generously any particular make will be purchased.

It seems to me that inasmuch as the value one receives for any given expenditure is, to the buyer, more important than the expenditure itself, it is very certain that the really efficient, educator type of service manager is going to play an increasingly important part in the motor car business of the future.

Relation of Size and Power to Airplane Speed

By A. Ludlow Clayden

THE results of the Pulitzer Trophy air contest at Mitchel Field teach a lesson which was learned long ago in automobile engineering that enormous engine power is not the main factor in obtaining speed.

The Verville Packard, which covered the course of about 132 miles in 44 min. 29 sec., has an engine of 2225 cu. in. and at the speed it was revolving must have developed not less than 550 hp. Yet the Thomas-Morse was only 2 min. 38 sec. slower though its Wright engine is of but 1125 cu. in. and developed not more than 330 hp.

Apart from the engine powers it should also be remembered that the Verville plane was designed with speed as the main object, while the Thomas-Morse is a standard army plane fixed up for maximum speed.

Even more interesting comparatively is the showing of the little Vought with only 718 cu. in. developing not more than 200 hp. in its Hispano-Suiza power plant. Its time was 11 min. 11 sec. longer than that of the winner or 25 per cent slower, with an engine less than one-third the size. Also the Vought ship is even less suitable for high speed than the Thomas-Morse.

Therefore, it seems reasonable to expect that by building as good a speed ship as the Verville Packard on a smaller scale, the performance of this plane might easily be equalled; just as automobile engineers found it actually easier to get high racing speeds from the 183 cu. in. engines than from the earlier 450 cu. in. engines.

In 1918 there was a prevalent opinion in France that the maximum speed combined with controllability would be found to require from 250 to 300 hp. That a larger

engine, requiring a heavier, larger plane, would be less lively and so little faster that the extra speed would only count in running away. Hence the French concentration upon the 300 hp. Hispano and the British anxiety to develop the A. B. C.

So far aviation engineering has shown that there is a great lack of co-operation between engine and plane designers. For instance, when it is a case of using maximum power for speed or climb, nearly all planes are shown to have inadequate water and oil radiators.

For utter speed we have as the limiting load the weight and bulk of one man. Since there is only one resistance to consider, that of the atmosphere, it seems reasonable to expect that the most compact plane with the least bulky engine would be the easiest ideal for which to strive. And when we have it the small fast plane will be much more useful than the big fellow.

Nickel Plating Aluminum

A PROCESS for nickelling aluminum is described in *Annales de Chimie Analytique* as follows: The aluminum is immersed for two minutes in a cold solution of ammonia and potassium cyanide. The metal is then well washed and brushed with milk of lime until the surface acquires an even, brilliant white tint. Then the washing and brushing are repeated with water, so as to get rid of all traces of lime, and the metal is immersed in an acid bath of manganese and iron chloride. A metallic coating of iron or manganese, which serves as the "mordant," as it were, to fix the nickel to the aluminum, forms upon the aluminum. After two to three minutes' immersion in the acid bath, the metal is rinsed with water and put in the nickelling bath, which consists of nickel sulphate. The anodes are plates of laminated nickel. The electric pressure used should lie between 2.5 and 3 volts, otherwise a non-adherent deposit would be obtained. The current density should be from 0.065 to 0.1 amp. per square inch (9.3-14 amperes per square foot). The treatment for moderate-sized objects lasts 1 to 1½ hr., and is followed by washing in boiling water and drying by compressed air.



The Verville Packard biplane which won the Pulitzer trophy

A Review of the Present Labor Situation

The open shop movement is gaining momentum, the fear of unemployment has increased individual efficiency, and Americanization work has diminished. Interest in labor problems has diminished, visibility of discord governs attention to the matter. No permanent advance can be expected as long as this attitude toward the problems continues.

By Harry Tipper

AN examination of the conditions which prevailed in industry during 1920 indicates great changes in the visible symptoms of labor unrest, great changes in the economic position in various fields and a slowing down in the demand for increased wages, shorter hours and other matters which have been included always in the consideration of the labor union whenever opportunity afforded it a chance.

In the United States, the year has witnessed a decrease in the power of the American Federation of Labor, due to the differences existing within its own ranks as to the policies which should be pursued, and at the same time a decrease in the solidarity of other labor organizations very largely due to the economic condition and the amount of unemployment.

The latter part of the year also witnessed a very definite movement for the extension of the open shop, a movement which is apparently gaining strength in various industries and which may have some significance in connection with the whole industrial question as time goes on. Wages have been reduced in many industries, and in most cases where these reductions have occurred they have been more drastic than the reduction in the cost of living to the same workers.

Workers in the manufacturing industries have been obliged to take reduction on the position and the price which the manufacturer could secure, whereas the reduction in their cost of living represents only those reductions which the retailer has been obliged to make, and there has not been established as yet a parity between the reduction made by the manufacturers and the prices to the consumer.

With the increased efficiency and the increased unemployment, there has been a very considerable reduction in the labor turnover which in the early part of the year was very high.

For the moment in this country, the visible labor troubles are less in number and materially less in importance. Where the organizations of labor are very strong and complete in their control of the labor employed by an industry, the difference is not so marked. In some of these cases, in fact, wages are still being slightly increased and efficiency has not been increased materially. The situation, however, indicates that the advantage is once more on the side of the manufacturer in most lines of industry and that the fear of losing the job, which is always in the background, is playing an important part in the attitude of the worker of to-day.

The depression which exists in Europe has not had the same effect, at any rate to the same extent, because the political and economic problems are so involved that while there is a great deal of unemployment and suffering, the labor organizations are still intimately concerned with the political programs and their attitude is governed to a large extent by the political necessities with which they are concerned. There is no indication that the unrest in Europe has diminished materially, and there is no present evidence which should justify an expectation of this kind in the near future.

This country is placed in a so much more advantageous position economically, that the severe unemployment is not sufficient to cause the unrest which obtains in Europe, and the political situation does not enter into the industrial question to the same degree because there are no affiliations between industrial organizations and political parties.

From the manufacturers' standpoint the present condition offers at least a relief from the constant problem which he was facing in connection with labor matters until the early part of last year, and it offers also an interval of relief of which he can take advantage in building his organization along lines which will make it possible for him to evade some of the labor trouble in the future.

There is a tendency in some quarters to over emphasize the change in the situation and imagine that it has a permanent significance, just as there was a tendency to explain the previous condition by reference to the war. The reasons which are at the bottom of the lack of organization in this country among the workers are important elements in the consideration of any plans for the establishment of prominent bases of operating efficiency. The number of races involved in the working population of this country and the difference in their traditional, political and social inheritance and their understanding, makes it difficult for them to come together in any well-ordered organization and makes it just as difficult for the employer to bring them together in any well-determined unity.

The infusion of further new labor by immigration will not solve this problem, although it may provide a larger supply, and therefore, retain the advantage on the side of the manufacturer for some time. In effect, however, it will add to the complexity of the situation and increase the difficulties which already exist in arriving at any well-ordered plan of operating efficiency based upon some unity of progress.

While we are considerably removed from the European situation and our conditions are very different from those obtaining in Europe, we will not be able to escape the influence exerted by the political movements and economic developments over there, and in respect of some of our working races, these influences will be quite definite and important.

The Americanization work which was developed with great vigor by many industries during the war and after the Armistice, has suffered in interest during the last six months, and is not the subject of discussion to anything like the same extent. This is somewhat unfortunate as the development of a reasonable understanding of our political and social structure is of primary importance in arriving at some unity, with so many different races involved.

It is apparent that the attention which was being given to the whole question of human relations in industry has diminished considerably in the last few months. It is now confined largely to those who have made a conscious study of the matter and are interested in it as a primary necessity, and these number only a small proportion of the people who were interested some time ago.

So long as the manufacturers proceed with their study of the matter and their attempts to provide a reasonable basis for its future consideration, the amount of public interest is not very important. It is referred to only because it is an indication of the interest taken in industrial circles and because it shows a general lessening of interest and not merely a decrease in the public attention to it.

The lessened interests of the manufacturers is also

shown by the diminution in new experiments to the point where they are hardly worth recording and the lessened interest in some of the experiments already started even in the establishments where the work has begun.

This whole situation in 1920 is an example of the way in which the visibility of discord governs our attention to the matter itself. In the early part of the year there was great activity in the discussion of human relations, a great deal of attention was paid to the experiments being conducted, the discussions which occurred and to the plans which were being developed.

In the latter part of the year this interest died down because the visible symptoms of the problem decreased until they were practically out of sight. No great permanent advance can be made so long as the interest in the question is governed by these visible considerations.

Experiments are undertaken too lightly in times of labor stress and dropped too willingly when the visible difficulty has passed away for the moment.

They are not based upon a sufficient examination in the first place, and they are not based upon sufficient conviction of their value to put them through the second period.

Fortunately, this is not true in all cases. Leaders in various industrial fields are still engaged in working this problem out by the gradual development of reasonable plans. The value of these plans will be more definitely established when they have survived the period of business depression and labor surplus in the same way that many of them survived the period of business activity and labor scarcity.

Office Manuals

AMONG the many minor factors which go toward making office personnel work effective the office manual serves a distinct purpose. Its value is chiefly as a means of immediate and systematic information for the incoming employee, but its effect is widely beneficial. Such a manual is often more effective in the office than in the shop, because the type of employee to which it goes in the former case is more likely to be really interested in the material it presents.

The object of publishing an office manual is practically the same everywhere. One firm states it in this way: "The purpose of this manual is to acquaint employees with the rules, regulations and policies of the company, and to serve as a practical working guide for new employees as well as a reference, to which experienced employees can turn when in doubt."

The longer a new employee takes to become familiar with the routine and workings of a new office, the more his hiring and breaking in is costing the firm. A well-made office manual will probably do more to make new employees feel at home quickly—especially in a large organization—than any other single factor. Such a publication will pay.

To be effective, however, it should be carefully written and edited. The preparation of such a manual is a job that need be done only once, and care should be taken in its preparation for it is worth doing well.

It should contain (1) office rules and regulations; (2) information about the equipment and facilities of the organization that every employee should know; (3) a brief sketch of the history of the company, and (4), possibly an organization chart followed by a brief ex-

planation of how the various departments function in relation to one another.

The New York office of the New Jersey Zinc Company issues an office manual which illustrates many points of good practice. This manual is published in pamphlet form and contains eight pages, including the cover. It explains briefly the facts concerning lost and found articles, cleanliness about the building, the profit sharing plan of the company, the pension plan, the library, the house organ, the cafeteria, the girls' rest room, the first aid room, the regular holidays granted, vacations, the system of periodic revision of individual salary rates, the promotion-from-within policy, the bulletin boards, personal telephone calls, methods of obtaining supplies from the stock room, fire drills and fire regulations.

It also states briefly the general office rules which apply to all employees. These include office hours, time record, absences, overtime compensation, etc.

Many of the best manuals include, beside such facts as those mentioned, a short history of the company. This is an excellent thing to include. It should be a recital of pertinent facts, rather than a glorification of achievements. It is desirable, however, to point out through the history any consistent ideals which really have characterized the growth of the organization. It is never advisable, however, to manufacture such ideals for the purpose of the history.

Of the many ways devised by personnel men for tying up the new employee to the organization, probably no method involving so little effort and expense is so effective as the orderly and interesting facts contained in a well-edited and constructive office manual.



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Important Factors in Fuel Economy

IF any engineer is disposed to question the practical effect of compression ratio, gear ratio, valve timing or fuel vaporizing means, on fuel economy, we recommend that he give careful study to the paper by A. L. Nelson presented at the annual S. A. E. meeting, which we print in this issue. In fact, we think there must be something wrong with any automotive engineer who can't find food for thought in this article. Perhaps it is true that there is little that is startlingly new in the paper, but the evidence produced proves that engineers in general are either ignorant as to the improvements in economy which have been demonstrated to be possible or have failed to apply their knowledge of the subject in such manner as to produce the desired result. More power to Mr. Nelson in his effort to get engineers to take a broader view of the fuel problem! May they also apply the lessons he has taught—be they new or old—and not forget that there are also other simple means

of materially improving fuel economy which are not new but which have yet to see any extensive practical application.

We predict that support of engineering research into possible methods of bettering fuel economy of modern automobiles will pay handsomely in future and believe the intelligent and progressive manufacturer should and will support it. He should give the engineer a freer hand in this matter than he has been allowed in the past.

Double Piston in Automotive Diesel Engines

IT is a noteworthy fact that in nearly all attempts abroad to adapt the Diesel engine to automotive purposes the double piston type of engine is selected. This type of construction was also used to some extent in the early years of automobile manufacture for engines working on the Otto cycle. The one make that comes to mind most readily is the Gobron-Brillie, which was manufactured in France for a great many years. But two other French pioneers, Koch and Krebs, also built engines on this principle. The object aimed at in these early engines was improved balance. With two pistons moving in opposite directions at the same speed, in the same cylinder the tendency of the reciprocating parts to cause vibration is eliminated.

Since the time when these early French motors were in vogue the double piston engine has received scant consideration from automobile engineers; it is naturally of somewhat complicated and unwieldy design, and in automobile practice balance of the reciprocating parts has been accomplished by increasing the number of cylinders to six or more. But when the Diesel cycle is to be used it is not practical to increase the number of cylinders in this way, for the reason that the smaller the cylinders the greater the difficulty of injecting fuel in the exact proportion needed. Indications now are that if the Diesel engine is ever used for automotive purposes it will be in the single cylinder form, and this being so, the use of the double piston design goes a long way in solving the balancing problem that comes up with every automotive engine.

Improved balance and reduced difficulty of fuel injection are, however, not the only advantages of the double piston design. The form of the combustion chamber during the early part of the power stroke is much more favorable than in the ordinary single piston type. This is especially important in a Diesel engine, where, on account of the high compression used, the compression space is exceedingly flat and has a large surface area relative to its volume. This means great loss to the cooling water through the cylinder jacket. The gain can easily be visualized by imagining the double-piston cylinder cut into two, the piston in each cylinder having the same stroke as the individual piston in the double piston cylinder. The flame-swept surface will then be increased by the area of the two cylinder heads. That this results in much greater cooling loss is clear.

Can We Double Mileage Per Gallon of Fuel?

IF we are to conserve our petroleum resources it is not only necessary to use the fuel in engines which are inherently efficient, but to see that the fuel furnished to the engine is mixed with the requisite proportion of air and so vaporized that complete combustion can take place in the extremely short time interval allowed. Extensive tests made by the Bureau of Mines show that **over 25 per cent of the fuel fed to the engine goes out with the exhaust in the average case.** To get better economy by preventing in some way the use of over-rich mixtures is indeed a great service problem worthy of study by the very best engineering talent, but this is only a part of the fuel problem.

By far the most important part is to use an engine which is itself inherently efficient. The constant volume or so-called Otto engine now in common use on all automotive vehicles is a highly efficient type, **providing it is designed with a sufficiently high compression pressure and is used most of the time at or near full load or in such manner that the compression is not lowered by throttling.** Unfortunately these two conditions are not complied with in average practice, but they are not impossible of realization. They have not been realized because it has proved easier to date to sacrifice them and waste fuel than to remedy them with consequent increase in economy.

This then is the problem which every engineer should study if he would make the automotive vehicle of the future truly efficient in fuel utilization. Efforts to eliminate the knock and thus make possible the use of higher compression with consequent increase in efficiency are commendable. But this alone will not suffice so long as we persist in using the throttle to limit the compression, for with other factors remaining the same, it is the compression pressure that actually obtains during the greater proportion of the time of operation that determines the efficiency.

How then can throttling be avoided in an engine which must quickly meet wide variations in load? It is possible to accomplish this in several ways. **One of these, which appears to be very promising and does not involve any very extensive change in the design of engines now used, has been tried by at least one prominent manufacturer in this country, and has resulted in more than doubling the mileage obtained from a given quantity of fuel.** It consists in providing two inlet valves per cylinder. Through one of these only pure air is admitted, and this supply is never throttled. In consequence the full compression pressure is maintained regardless of load. The air entering the other valve is drawn through a carburetor arranged to furnish a rich mixture containing fuel in sufficient quantity to carry the load. This mixture is diluted in the cylinder by admixture with the air which entered through the first valve, but at least a portion of it is retained in a pocket which forms a part of the clearance space. The spark plug is located in this pocket and is consequently always in contact with a readily combustible mixture at the time of ignition. At full load the quantity of fuel admitted is sufficient to unite with all the oxygen taken in through both valves, but at all lighter loads there is present an excess of oxygen which tends to promote complete combustion. The charge is, however, never too lean to burn, due perhaps to a partial stratification. Similar results have been obtained by using but one inlet valve per cylinder and carbureting only part of the air; also by the use of a properly designed fuel injection system.

Accomplishing the desired result will present difficulties which only persistent effort will overcome, but success will more than justify the means employed. **It is certainly worth while to make a real effort in the direction indicated when tests already made have shown that more than double the mileage attained with a car and engine of conventional design can be attained by the simple change outlined.**

Improvement in manifolds, vaporizing devices and carburetors should continue, but the time has come when some more radical improvement is necessary. We have pointed out one way in which a long step forward can be made. There are, no doubt, many other ways in which similar results are attainable. **The progressive engineer will welcome an opportunity to tackle the problem. He should receive whole-hearted support from the manufacturer.**

Buying Move Starts in New York

Many Sales Reported in After-Show Week

Entire December Business Exceeded in Some Instances— Used Cars in Demand

NEW YORK, Jan. 24—The week following the New York Show has brought an inspiring revival in automobile sales, wholesale and retail. A canvass of a majority of the distributors and factory branches shows that cars have been moving in much better volume than in November and December and in a number of places retail sales of the past week, nearly all traceable to the show, have exceeded in volume deliveries for the entire month of December.

Distributors and factory branch managers generally are agreed that dealers in the territory have a new lease of life. There were a good many show visitors from the territory, particularly from the suburban towns of New York, New Jersey and Connecticut, and the names of "foreign" prospects, promptly delivered to dealers in the outside towns, have already yielded an encouraging number of sales. Outside dealers who have been into New York or have written in since the show say that the ice has been broken and their towns are showing unmistakable signs of a steady, though gradual return of buying.

In the retail end there has been a noticeable revival in the metropolis itself. There are more people in the salesrooms than at any time since October, some have bought during the week and others are definitely in the market for March or April delivery. Sales this week have naturally been in most cases for February delivery to save the owner from obtaining a 1920 license, which expires at the end of this month.

Reports Six Sales in Week

As an instance of the "pick-up" in sales, one car in the \$2500-\$3000 class had six sales this week, more than in all of December, and one in the low-priced class had six a day the first four days following the show. All along the lines there have been some sales and both in personal contacts of salesmen and through mail efforts there has been an encouraging response to work on prospects listed at the show.

All along the row, in addition to actual sales and perhaps more important, there is a better feeling among dealers and salesmen. Nobody is looking for business equalling the 1920 volume but everybody is confident that a reasonable business is attainable and everybody is cheerfully working to get his share.

Truck sales have picked up slowly ever since the first of January. Business is

far from normal but it is surely improving.

There are more used car inquiries than there were before the holidays and dealers have been able to take in used cars at more favorable prices than prevailed the last of last year. This is always the case as spring approaches and the hankering for a new car becomes stronger and dealers are finding encouragement in the reappearance of this condition.

The New York Show, never a big selling show, has done a lot for the trade this year and even the most conservative distributors are paying it a tribute.

Shows Curing Slump, Reeves Tells Dealers

MILWAUKEE, Jan. 22—Speaking before the Wisconsin automotive dealers at their dinner here, Alfred Reeves, general manager of the National Automobile Chamber of Commerce, announced that the New York automobile show moved the industry off dead center and sent it forward on its way toward a normal spring sales season.

Reeves said the trade could not expect to soon duplicate the extraordinary business of last spring, but with the increasing need for transportation, the motor car and truck business should be almost normal during the spring, following which sales would depend largely on the general business situation.

An industry that does more than two billion dollars wholesale and is the second largest manufacturing industry in the country naturally had to take time to slow down and will take some little time to get into its stride again, Reeves said. Some of the biggest banking houses in the country, just getting into the automobile business, declare it is now on a settled basis, declared Reeves. This includes J. P. Morgan & Co., and the Du Ponts.

Flint Raises \$5,000,000 to Back Durant Motors

FLINT, MICH., Jan. 24—Citizens of Flint have subscribed an amount aggregating \$5,000,000 for investment in Durant Motors, Inc., which will locate its first plant in this city. Flint regards W. C. Durant as its "favorite son" and is willing to back his new enterprise with cash. An offer has also been made to Durant of 40 acres of land.

MURRAY SUCCEEDS CURRAN

DETROIT, Jan. 24—W. J. Murray has been elected president of the Curran-Detroit Radiator Co., to succeed E. T. Curran. C. S. Reid is now vice-president; H. H. Rowe, treasurer and general manager, and H. F. Lacey, secretary. J. A. Kring and H. I. Phillips have been elected directors.

Chicago Prepared for Greatest Show

Thousands of Dealers Booked to Attend Big Convention and Exhibit

CHICAGO, Jan. 24—Chicago is ready for the twenty-first annual automobile show which will be held from Jan. 29 to Feb. 5 and which will play as important a role in the revival of business in the automobile industry as that held at New York several weeks before. Enthusiasm is being manifested outside strictly dealer circles and beyond the confines of automobile row for local merchants, theaters and restaurants have not escaped hearing of the effect of the New York show on conditions in that city.

Dealers will flock here just as they flocked to New York though perhaps in greater numbers for Chicago is more centrally located and more easily accessible to the Middle and Far West and Easterners, as a rule, rather like the idea of coming here. At any rate, reservations at the hotels in the city, large and small, indicate that nearly every inch of space available has been taken.

There will be plenty going on all the time from the afternoon the doors of the show at the Coliseum, First Regiment Armory and the New Drake Hotel, where the salon will be held, are thrown open. The truth of the matter is that business in connection with the show will start the preceding night, Jan. 28, with a dinner given at the New Drake by the Chicago Automobile Trade Association.

Graham and Kroh to Speak

Distributor members of the association have invited their Chicago sub-dealers and also their dealers from the Chicago territory together with salesmen and factory executives. George M. Graham, vice-president of the Pierce-Arrow Motor Car Co., and A. R. Kroh, who has become known in automotive circles not only through his previous active participation but through his country wide talks on the motorization of the farm, will be principal speakers. Louis A. Peil, president of the association, will be toastmaster and there will be a prominent New York banker to discuss the financial end of the industry.

From Jan. 31 to Feb. 1 the fourth annual convention of the National Automobile Dealers Association will be held at the Hotel La Salle, the third annual trade frolic to be held in connection with it.

On Feb. 1 the annual dinner and election of officers of the Old Timers Club
(Continued on page 191)

Ford and Banks Spar on Financing

Both Sides Veil Progress of Deal

Manufacturer May Offer Securities Direct to Public—Size of Loan Sought Unknown

NEW YORK, Jan. 25—Wall Street and the financial circles adjacent thereto have been greatly excited for the past few days about the financing of Henry Ford. They admit he needs to be financed and they have evolved a dozen or fifteen ways of doing it. According to Wall Street negotiations are closed every afternoon only to be opened the next morning. It is stated to-day that various banks admit that the deal is virtually completed only to have the banks deny it to-morrow. Meanwhile the person who naturally would be most interested is standing pat and saying nothing.

So much has been heard in the past week about the dire need of Ford for funds and about his frantic appeals to the banks for assistance that the impression is gaining ground that the barrage of reports and rumors has been sent up more or less as a smoke screen.

One solitary fact stands out. That is, that Ford undoubtedly will find it necessary to do some financing in the near future. His representatives do not deny that he is short of cash and that large sums must be raised to meet taxes, trade acceptances, and other obligations falling due soon.

There is very good reason to doubt, however, that Ford will play "Daniel in the Lion's Den" for the banks. He never has had any love for bankers, and bankers have reciprocated his feeling for them. It can be regarded as certain that if he negotiates a large loan it will be on his own terms rather than theirs. If he cannot make arrangements reasonably satisfactory to himself, the chances are that he will attempt to sell securities direct to the public, and it is known he believes such an offering would be successful. Some banks are inclined to agree with him. If Ford does ask the public for funds it is now considered likely that he will offer bonds rather than stock. These bonds would offer an attractive return.

Estimates Range to \$100,000,000

Wall Street estimates of Ford's needs, range all the way from \$25,000,000 to \$100,000,000. It is not probable that even Ford himself knows what the figure will be. It is understood that his current obligations, aside from merchandise accounts and Federal taxes, are less than \$25,000,000 and represent trade acceptances due in March. In addition to this a large sum will be needed to put his

FORDSON TRACTOR CUT

DETROIT, Jan. 26—The price of the Fordson tractor was reduced to-day to \$625, the new price to be effective at once. This is a reduction of \$165.

Dr. Samuel S. Marquis, head of the sociological department of the Ford Motor Co., has offered his resignation. It has been mutually agreed, he said, that no action was to be taken on it for the present. He declined to discuss his reasons.

factory into operation again. His Federal taxes are estimated at from \$30,000,000 to \$40,000,000.

Ford has neither confirmed nor denied reports that he was negotiating with New York bankers, and it is probable there have been discussions in regard to a large loan. It is equally probable, and in fact practically certain, that Ford has declined to agree to the demands of the banks, which are understood to have insisted on an arrangement which would have given them practical control of the company's finances and left Ford in control only of the manufacturing end.

Seeks "Friendly" Institutions

It can be said positively that if Ford does arrange a large bank loan, it will be with institutions which are relatively friendly to him and not with those which are eager to get him into their power. One of the banks friendly to Ford, and with which he has done much business, is the Liberty National of New York, classed as a Morgan institution. Joseph A. Bower, a vice-president of the Liberty National and formerly a banker in Detroit, spent virtually all of last week in Detroit and is understood to have been offered the position of treasurer of the Ford company. He declined to accept, however. Bower refused to-day to discuss the Ford situation beyond stating that the Detroit manufacturer might not find it necessary to borrow any money at all.

The reports that Ford was in the market for funds have been made the texts of sermons on finance preached to him by financial papers. It is probable that these editorial discussions have been inspired by powerful financial groups. The substance of them has been that Ford should have stuck to the manufacture of automobiles and not purchased railroads, coal mines, iron mines and timber lands. He also has been taken severely to task for the attacks upon the Jews made by the Dearborn Independent, owned by him!

Wills Distribution to Start in March

Final Work on First Production Starts—Molybdenum Steel Features Construction

MARYSVILLE, MICH., Jan. 22—The first cars from the production line of C. H. Wills & Co., will be completed within a few days. The car is to be known as the Wills Sainte Claire.

While the actual price has not been announced, it is known that it will sell for approximately \$3,000, or about \$1 a pound. Complete technical details on the car will not be available until it is in the hands of the dealers, which is expected to be sometime in March. It incorporates, however, an eight-cylinder, 60 deg. V type engine mounted on a chassis of 121 in. wheelbase, and equipped with 32 x 4½ in. cord tires. Probably the most outstanding feature of the car is the extensive use of molybdenum steel which is employed in all parts of wear and stress. It is stated that by the use of this alloying substance it has been possible to produce steel of 185,000 lb. per sq. in. tensile strength. This has been affected by the use of chrome-nickel molybdenum alloys. The highly stressed motor parts such as the crankshaft, connecting rods, etc., are all of molybdenum steel, as well as the chassis wearing parts, even to the springs.

Engine Wills Product Throughout

The eight-cylinder engine has a bore and stroke of 3¼ by 4 in. It develops approximately 70 hp. and gives the car a speed range on high gear of from 2 to 70 miles per hr., or better. The engine is a Wills product throughout being the only overhead camshaft, eight-cylinder engine in use on this side of the water. The camshafts which are mounted above the blocks on each side of the engine are driven by spiral bevel gear shafts from the crankshaft, the drive being taken up the front end of the block by the spiral bevel gears and then to the camshaft, which extends overhead with the cams integral, driving the valves which open downward into the cylinders direct. The use of the eight-cylinder engine with a short, sturdy crankshaft and with a 60 deg. angle, permits an exceptionally fine opportunity for balance, and the result is that no period is discernible in driving the car.

The Detroit representative of AUTOMOTIVE INDUSTRIES had the privilege of driving the car over the roads around Marysville and found it to have exceptional accelerative ability throughout the entire speed range. The light weight of

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Bay State Factories on Low Schedules

Return to General Operation Progresses Slowly — Wage Scales Revised Slightly

SPRINGFIELD, MASS., Jan. 24—Automotive trade conditions in Worcester and Springfield show several encouraging signs, although there is no marked change for the better.

The Norton company has announced a 10 per cent cut in salaries, effective Feb. 1. Wages have not been cut up to the present time, but working hours have been reduced considerably. Every effort is being made to hold experienced workmen, and something like 50 per cent of the normal number of workmen is still employed.

The Worcester Pressed Steel Co. is operating at 20 per cent normal. Wages have not been cut, but readjustments are being made in the case of certain classes of unskilled workmen.

The open shop movement is being vigorously supported by employers in this section and several union strikes outside of the automotive industry are now in progress as a result of wage reductions.

Gilbert & Barker in Springfield furnish an encouraging variation from the general depression in most manufacturing plants. This firm, which normally employs about 1600 workers, has laid off only a few hundred men. It is continuing manufacture at nearly 85 per cent of normal. Neither day rates nor piece rates have been cut and there is no immediate intention of such action.

The new Westinghouse Electric & Mfg. Co. plant at East Springfield, is in operation on a greatly curtailed schedule and no additional men are being hired at this time.

A slight cut in piece-work rates has been made at the Hendee Mfg. Co., makers of the Indian motorcycle. Operations are continuing at about 40 per cent of normal both on the heavy machines and on the scout model. This is a union shop, but no serious difficulties were experienced when it was found necessary to make wage reductions in view of present conditions.

Throughout this section a general opinion prevails that business has started very slowly on the up-grade, and that a gradual return to normal will be experienced from now on. There is no indication, however, of any sudden increase in manufacturing activity.

Motorcycle Schedule Set at 55,000 for 1921

SPRINGFIELD, MASS., Jan. 24—Motorcycle production for 1921 will probably drop slightly below the 1920 level, according to the best estimate now available. The Hendee Mfg. Co. schedule at present calls for some 15,000 to 18,000 machines this year, while the Harley-Davidson schedule has been reduced to about 18,000. During 1920 both of these

concerns made over 20,000 machines, and their plans for the coming year give an excellent indication of the trend of production, since these two, together with the Excelsior organization, produce the vast majority of motorcycles now made in this country.

In 1920 about 70,000 motorcycles were produced in the United States, while present indications point to a production of about 55,000 for the present year. Brightening of general business, conditions, of course, would serve to raise this estimate again.

Goodrich Creates Fund for Contingent Losses

NEW YORK, Jan. 24—Directors of the B. F. Goodrich Co. have voted to set aside out of the surplus a reserve of \$10,000,000 to provide for all possible contingent losses on raw material commitments for future delivery. A dividend of 3½ per cent has been declared on the preferred stock, half of which is payable April 1 and the other half July 1. Action in regard to the May dividend on common stock will be taken at a meeting in April. A statement by the directors says:

"Audit of the accounts for the calendar year 1920 has not been completed, but the general result indicates that earnings for the year will be very largely consumed in writing down the inventory of raw materials on hand at a fair market value. Net sales for the year amounted to approximately \$150,000,000."

ReVer Motors Solvent Assets Triple Debts

INDIANAPOLIS, Jan. 22—A finding of solvency in the bankruptcy proceedings instituted against the ReVer Motor Car Corp., of Logansport, three weeks ago, has been made in Federal Court by Harry C. Sheridan of Frankfort, special master. The decision has been expected ever since the hearing last week, when Sheridan indicated he was convinced of the solvency of the concern. The finding points out that expert accountants had testified that the assets of the company on Nov. 30, 1920, were \$1,157,328.59 and liabilities only \$354,659.90, and that no attempt to question or contradict the figures had been made. The proceedings were brought by three Chicago concerns.

DUPLEX ADDS TWO DIRECTORS

LANSING, MICH., Jan. 21—The Duplex Truck Co. has increased the number of its directors and the new members elected are Bert S. Gier and Charles W. Nichols. President H. M. Lee stated that the sales department has received more inquiries and orders since Jan. 1 than during the entire period of the slump in the automobile business.

AIR FIELD APPROPRIATION ASKED

HARTFORD, CONN., Jan. 24—The Hartford Municipal Aviation Commission has asked the city for an appropriation of \$12,500 to provide a landing field for aviators who wish to stop in the city.

Garages Continue High Wage Scales

Concerted Reductions Thought Delayed by Unusual Amount of Repair Work

NEW YORK, Jan. 24—Though there has been no concerted action on the part of garage men to reduce wages of mechanics to a rate approximately that existent before the war, or any specified rate, there is a widespread movement throughout the industry to cut down on wages boosted to unnatural scales by the exigencies of the war-time situation.

New rates of compensation are based entirely upon the conditions existing in the individual communities in which they are applied. In many cases only scattered shop owners in cities like Boston, Philadelphia, New York and others, which number hundreds of garages, have cut wages, but they have suffered no dearth of mechanics, and their work apparently has not been less efficient.

Detroit is perhaps the only city in which concerted action has been taken by an association of owners, the Detroit Automobile Dealers Association having promulgated an entirely new scale of wages in which all concur, and the mechanics have seen the advisability of accepting. Where higher rates have been sought by mechanics in the past few months, owners have acted in concert in opposing them and have been successful. Unions were principally responsible for this activity, notably in New York, Kansas City, and several cities in the West.

Cities which report no concerted wage reduction activity are Boston, Philadelphia, New Orleans, Cincinnati, Sacramento, Cal., New London, Conn., Rock Island, Ill., and Cedar Rapids, Iowa. In all of these there have been individual instances of reductions and general cuts are believed to be, as in Philadelphia, only a matter of time.

A notable reason, perhaps, for the failure of a concerted reduction move to materialize to this time is the unusual amount of repair work being offered to garages, ascribed to open weather conditions, and also to the belief that many owners will make their old cars carry them over for another season or two.

FOUNDRY DIRECTORS RE-ELECTED

BELDING, MICH., Jan. 22—The Belding Foundry Co. has re-elected the present board of directors which consists of Henry J. Hartman of Grand Rapids, J. C. Jenkins of Big Rapids, A. B. Johnson, Albin Johnson and William F. Sandell of Belding. It was announced to the stockholders that the business during the past year had been very satisfactory and that the outlook for this year is good. There is no doubt that with the gradual improvement of general conditions throughout the country that the company will get more business and perhaps make this its biggest year, officials said.

Canada Plans Split on Excise Refund

**Manufacturers to Share Dealer
Burden on Unsold Cars—
General Business Better**

OTTAWA, ONT., Jan. 22—The buyers' strike, so far as the Canadian motor trade is concerned, is rapidly breaking down. Many dealers and distributors report more actual sales during the past three weeks than during the preceding three or four months. The feeling is general that the corner has been turned and pessimism has been deposed by optimism.

A week ago Friday, a joint committee of Canadian dealers and manufacturers conferred at Ottawa with Sir Henry Drayton, Minister of Finance, in support of the request made by the deputation of dealers from all over the Dominion, which had urged him to use his good offices to induce the Government to rebate to the dealers the excise tax (15 per cent ad valorem on cars retailing under \$3000 and 20 per cent on cars retailing at \$3000 and over paid on unsold cars in stock at the time of the repeal of the excise tax.

The Minister made clear his sympathy for the Trade but pointed out difficulties with which he was faced. No precedent for the requested refund would make it necessary to have an Act of Parliament passed during the forthcoming session of the Legislature to sanction it. Lack of funds would make the reimposition of the tax in part necessary to raise the moneys wherewith to make the refund. Other trades and industries similarly circumstanced would also demand refunds and so forth.

The manufacturers' representatives then tentatively agreed that provided the Minister of Finance would agree not to impose further taxes on motor vehicles they would rebate the dealers and set prices that over a period of a year would extinguish the refunds. Owing to the sales resistance factor, it was later agreed at a meeting of the manufacturers in Toronto that an increase in car prices would be very ill advised at this time, particularly as the public, in all probability, would learn of the reason for the increase and would therefore, to a considerable extent, continue the sales siege until the absorption of the loss in question permitted price reductions. A continuance of sales resistance would be extremely harmful, it was agreed.

Would Maintain Present Prices

The proposal was then made that the manufacturers meet the dealers half-way by absorbing fifty per cent of the loss with which they (the dealers) were faced, without increasing the price on their cars. It was hoped originally that all the Canadian manufacturers would concertedly adopt this expedient. Possibly all will but certainly not concertedly for to-day the General Motors of Canada, Ltd., McLaughlin, Chevrolet

and Oldsmobile, and the Willys-Overland, Ltd., have advised their dealers that they have decided on the 50-50 plan.

It is believed the other car manufacturers will soon follow suit or possibly announce independent plans. The Ford Co. of Canada, Ltd., in a telegram to the Toronto Automobile Trade Association, stated that action, if any, would be deferred till the end of the month, at which time the Ford dealers' convention will be held.

Former Navy Planes Find Canadian Buyers

NEW YORK, Jan. 24—The Aeromarine Engineering & Sales Co. which recently acquired surplus aircraft and engines from the Navy Department, announces that the Canadian Government recently purchased ten Navy flying boats which are to be utilized in forest patrol and in connection with the Canadian northwest mounted police. It also announces that negotiations are pending which will result in the establishment by next July of an aerial transportation and freight line between Edmonton and Great Slave Lake and Fort Norman in the McKenzie River basin.

This is the region in which there has recently been such activity in connection with the discovery of oil and the plan is to transport prospectors over the 800 or 900 mile route by air. The aerial transportation line which is to utilize the Aeromarine navy flying boats, following the course of the McKenzie River and nearby lakes, will carry passengers over this route in twenty-four hours, whereas by pack and canoe, the time required is from six weeks to two months.

Under its arrangement with the Navy, the Aeromarine company will be able to sell flying boats on the installment plan instead of for spot cash. The purpose of this plan is to encourage civilian flying and thereby facilitate the training of an aeronautical reserve. The price of these boats has been fixed at \$6,160.

SEEK \$500,000 FOR IMMEL

COLUMBUS, Jan. 22—At a meeting of the stockholders of the Immel Co., manufacturers of automobile bodies, which is in the hands of Robert H. Schryver, receiver, a committee was named to solicit funds to raise the receivership. H. S. Gilmore was named chairman of the committee. It is planned to raise \$500,000 of which \$400,000 will be necessary to raise the receivership leaving \$100,000 for working capital. In the meantime work at the plant is practically ended although there are about 40 closed bodies to be completed before the plant is entirely closed down.

SPARTON TANKS ENJOINED

NEW YORK, Jan. 24—The United States Court of Appeals has upheld the decision that the manufacture of Sparton vacuum tanks by the Sparks-Withington Co. is an infringement of the Stewart-Warner patents and has enjoined the further manufacture of Sparton vacuum tanks.

Protests Unheeded, Truck Sales Go On

**Coast Dealers Aroused Over Failure to Prevent Dumping
of War Vehicles**

LOS ANGELES, Jan. 22—Motor truck dealers here are feeling keenly the effect on business of the arrival and sale of seventy-five trucks brought from Europe. Protest has been made against this sort of competition to the National Automobile Chamber of Commerce, National Automobile Dealers Association, congressional representatives and others but there has been no suggestion of relief. "It's too bad" and "It ought not to be allowed," are expressions received but further than that nothing has developed at this time.

A meeting of the truck dealers of the city has been called for Thursday night at which time some plan of action may be decided upon. It is understood that the seventy-five trucks already received will be followed by more and that is the thorn that is sticking the hardest, as representatives of all but one truck line are wondering when the end will be. The one exception is the Transport truck dealer who is acting as sales agent for the imported trucks. This dealer has issued the advertising over his signature and is advocating the sale of the trucks at "about one-half the list price."

Speaking for the other truck dealers as well as himself, one dealer said to-day: "It would seem there is some way to control a proposition of this kind but the way is undiscovered. Where is our so-called protective tariff? These trucks originally were American-made but they are not American property now and are being sold in direct competition with our trucks that have to pay no end of special taxes? Handled as they are, it is not even necessary that the owner have a dealer's license. We understand additional shipments now are en route.

"There are enough American-made trucks now in Europe to become a serious menace to the entire market in this country if all are brought over here. What sense was there in American manufacturers insisting that the war trucks and automobiles originally shipped to Europe be left there and sold away below their real value, if now they are to be brought back here as privately owned and be put on the market? The truck business to-day is bad enough without having such a situation to deal with."

TO BUILD PETROLEUM ENGINE

CHICAGO, Jan. 21—The Petroleum Motors Corp., organized about eighteen months ago to develop an opposed piston type, heavy duty truck and tractor engine to operate on low grade fuels, has completed its experimental work and has reorganized for \$1,250,000 par value \$10 per share to go into the manufacturing of these engines, and will soon start production on a small scale.

Wilson Advocates Air Mail Operation

President Concurs in Report of National Advisory Committee —Bill Before Senate

WASHINGTON, Jan. 24—Concurrence of President Wilson was appended to the report of the National Advisory Committee for Aeronautics, recommending continuance of the air mail service, which was transmitted to Congress today. The report declared that the air mail service was a necessary means for the development of the civil aircraft activities of the nation.

The practicability of heavier-than-air planes for civil as well as military uses has been demonstrated by the air mail service, the report asserted, and adds that though the value might not be apparent in terms of dollars and cents it would be easily seen should the nation be called upon again to mobilize its air forces.

The report was signed by Joseph S. Ames, chairman of the executive committee of the National Advisory Committee, which is composed of representatives of the Army and Navy and several prominent civilians.

The Post Office Appropriation bill, from which the House cut \$1,250,000 intended for the air mail service, is now before the Senate Post Office Committee. Unless the Senate makes provision for the service, no funds will be available for it after June 30.

Madden to Push Probe of Larsen Purchases

WASHINGTON, Jan. 24—Congressman Madden of Illinois, announced today that he intended to press for action on his resolution introduced in Congress last week requiring the Post Office, War and Navy Departments to report details regarding the purchase of German airplanes. It is claimed that the purchases were unauthorized and a violation of treaty obligations. The destruction of three metal planes and the loss of life is said to have inspired the inquiry.

According to the Congressman, the planes used by the Post Office Department were purchased through an agency controlled by John Larsen. These eight machines cost the Government \$12,500 each, while the War Department purchased three at a cost of \$100,000. The War Department planes had additional equipment. The Navy Department paid out the same amount for three monoplanes.

Zeppelin Branch Here Declared Possibility

NEW YORK, Jan. 24—Since the visit to America last summer of representatives of the Zeppelin interests, there have appeared from time to time in the public press many contradictory reports as to the future plans of this company. Apro-

pos of this an item which appeared in the German "Flug-Welt" of Nov. 24, 1920, will be of interest.

According to this report, certain commercial steps were discussed and negotiations initiated with regard to the delivery of a ship. However, no contract was made and nothing conclusive resulted from these preliminaries. In point of fact, according to "Flug-Welt," the Zeppelin plant is still inoperative by reason of treaty regulations, and the use of the company's commercial ships has also been forbidden awaiting certain discussions of the Air Commission. Meanwhile, of course, the company is cut off from international competition.

"The transfer of the Zeppelin plant to the United States is clearly impossible," says "Flug-Welt," "it is, however, not impossible that a branch may be started in that country in the future."

Harvester Price Probe Urged Upon Congress

WASHINGTON, Jan. 24—A resolution asking for investigation of complaints that the International Harvester Co. has announced its intention of increasing the price of some of its farm machinery products was introduced in the House today by Representative Jones, Democrat, of Texas. The House Interstate Commerce Committee is directed by the resolution to make an inquiry and if prices have been raised to find out why.

Company Welcomes Inquiry

CHICAGO, Jan. 24—The following statement was made by officials of the International Harvester Co.:

"While we have no detailed information about the resolution, we will welcome any inquiry along the lines, being satisfied that the only result will be to convince the public of the fairness of our prices.

"Our prices are now and always have been based solely on the cost of production. Our current prices are practically the same as for the last ten months. There have been some slight increases on some machines and reductions on others, with the result that, considering our line as a whole, the price level for 1921 is substantially the same as for 1920."

WOULD CHANGE TRUCK DESIGN

WASHINGTON, Jan. 24—Suggestions have been advanced to automotive engineers by Earl B. Smith, senior assistant testing engineer, Bureau of Public Roads, for changes in the design of motor trucks which would distribute the load more nearly equally between the front and rear axles so that the load on the rear wheels would be lessened. This recommendation is made in an effort to reduce the cost of highway repairs.

MAXWELL-CHALMERS ADDS MEN

DETROIT, Jan. 24—Maxwell-Chalmers Corp. has added 450 workers to the operating staff during the past week and will make further additions this week.

Depression Defers Standard Parts Plan

Committee Votes to Continue Receivership When Stock Subscription Falls Short

CLEVELAND, Jan. 24—The receivership of the Standard Parts Co. will be continued for the present owing to the failure of stockholders to raise sufficient funds through the subscription of new stock, to place the company back upon firm financial footing. This decision was made unanimously at a meeting of the reorganization committee Friday at the Cleveland Trust Co.

Failure of the re-establishment of the company to go through as planned is ascribed to the financial depression which made it impossible for many of the stockholders to take their portions of the new stock.

The report to the creditors of the reorganization committee, consisting of F. H. Goff, chairman; George A. Coulton, John Sherwin, E. E. Walker, H. C. Robinson, Cyrus H. Eaton, Leon F. Payne, H. W. Chapin and H. L. Thompson, follows:

"On Oct. 26 your committee advised you that the committees representing the preferred and common stockholders of the Standard Parts Co. had agreed upon a plan whereby reorganization of the company would be effected through the sale of new issues of preferred stock in the amount of approximately \$6,000,000, arrangements to be made with certain banks for lines of credit of \$4,000,000.

"At that time your committee believed that stockholders would be able to take new issues of preferred stock.

"Owing to the financial depression and the difficulty of securing money, many of the stockholders were unable to take the pro rata share of stock which it was contemplated they should take of the new issues, and the reorganization committee has been unable to secure sufficient subscriptions or to complete the plan.

"For the above reasons it is the opinion of your committee that the company should continue under the receivership under closer co-operation with your committee.

"From time to time this committee will report the progress made by the receivership, and if times become more propitious and a new plan for reorganization is submitted by the reorganization committee, this committee will consider the same and advise you concerning it."

STAR TIRE ALLEGED BANKRUPT

AKRON, Jan. 22—A petition in involuntary bankruptcy has been filed against the Star Tire & Battery Co., Steubenville, O., on the petition of three creditors whose claims aggregate \$4,161.90. The creditors are the Goodyear Tire & Rubber Co., Kokomo Rubber Co., and the Gulf Refining Co.

Chicago Prepared for Greatest Show

**National Tire Dealers' Association
to Be Organized—N. A. C. C.
and S. A. E. to Meet**

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will be held in the Florentine room of the Congress Hotel. This organization, composed exclusively of veterans in the automobile industry was initiated at the New York show a year ago by one of the old timers. The organization will be perfected at the meeting next month. The nominating committee has selected for president, Albert Champion, president of the Champion Ignition Co. of Flint.

Show week, Jan. 31, to be precise, will see the inauguration of a national tire dealers and vulcanizers association which will bring together all the individual tire dealers organizations throughout the country. The meeting will be held in the Morrison Hotel under the auspices of the Chicago Tire Dealers Association, and will continue over Feb. 1 and 2 and Feb. 3, if necessary.

The directors of the National Automobile Chamber of Commerce will hold a meeting on Feb. 2 and on the same evening the annual dinner of the Society of Automotive Engineers will be held at the Morrison.

On Feb. 1, at the Congress, the Motor Truck Manufacturers Association will hold their annual meeting and on the following day at the Morrison will be held a meeting and dinner of the Chicago Truck and Tractor Association.

For three days, Feb. 2 to 4, the Automotive Electric Service Association will meet at the La Salle.

Cleveland Exhibit Gets Flying Start

CLEVELAND, Jan. 23—Saturday's attendance in spite of rain was 20 per cent above the opening last year and a Sunday crowd which exceeded all Sunday records, gave the Cleveland Automobile Show a flying start. The management and the dealers were frankly surprised at the outpouring with the admission raised from 50 to 75 cents, and accepted it as an indication that volume buying is about to return.

The show opened in a heavy downpour which only partly cleared away in the evening, but people came just the same. Actual paid admissions at the gate were 2076, as compared with 1954 last year, and the grand total of attendance, including complimentary and reduced price tickets sold to dealers for distribution was 6000, as against 5000 in 1920. Sunday was clear and cold, and the crowds thronged the aisles until 11 p. m., numbering about 50 per cent above that of Sunday last year.

There were a number of sales Saturday. Then the big rally this noon, attended by dealers from all over Ohio, put

additional inspiration into the trade to make this one of the best shows of this city of successful dealer expositions.

All of the Cleveland manufacturers are represented by complete exhibits of their products. Factory representatives are paying close attention to buying indications with a view to forming a production policy for the first part of the year. There are few cars stocked at the factories and manufacturers are desirous of meeting demands with immediate deliveries.

Exhibit Seven Vehicles at Electrical Show

NEW YORK, Jan. 24—Manufacturers of five electric commercial trucks and two electric passenger cars will exhibit at the electric automobile show which opens Saturday at the showroom of the New York Edison Co., this city. In addition there will be exhibits by manufacturers of batteries, charging apparatus and accessories.

Trucks assigned space are Commercial, Lansden, Oneida, Walker and Ward. The passenger cars are Berg and Rauch & Lang. Battery makers exhibiting are Edison, Electric, General Lead and Philadelphia. Apparatus and accessories, Anderson Mfg. Co., Auto Electric Devices Corp., Allen Bradley Co., Cutler-Hammer Mfg. Co., General Electric Co. and Westinghouse Electric & Mfg. Co.

There will be no admission charge to the show and the space to exhibitors has been granted without charge. In the week starting Feb. 7 there will be an exhibit of industrial trucks.

Automotive Stocks Show Market Gains

CLEVELAND, Jan. 25—Transactions on the Cleveland Stock Exchange indicate that the automobile industry in this district is picking up. Shares of practically all automobile manufacturing establishments in this city have sold up from one to five points in the last week. Grant Motor common has come up from 1 1/4 to 3 3/4 points. Peerless has risen three points; Standard Parts three points, and other stocks have shown strength.

Recent strength in automobile shares was brought about by the belief that the automobile shows in New York, Chicago, Cleveland and in other cities would show the trend of automobile demands. No one expects a mad scramble of buying, but there is a strong belief the next month or two will bring about steadily increasing orders. Foreign demand for cars also is expected to be above normal.

PHELPS IN RECEIVERSHIP

COLUMBUS, Jan. 24—Upon the application of Louis N. Reif, a holder of a note for \$3000 against the company, Judge Duncan has named J. H. Weisenback and Thomas W. Pickard receivers for the Phelps Mfg. Co., a manufacturer of wire wheels for automobiles. The company had a capacity of about 100 sets of wire wheels daily. Pickard reports that operations are being continued under orders of the court.

Dealer Sues Davis for Contract Breach

**Damages of \$4,357.88 Asked As
Extra Commission Due On
Sales for Year**

INDIANAPOLIS, Jan. 22—Suit for \$9,357.88 for alleged breach of contract was filed against the George W. Davis Motor Car Co. of Richmond by Spencer G. Kuhn of Cincinnati, in Federal Court, here.

The complaint charges that Kuhn and Amos E. Chevraux, comprising the A. & K. Automobile Co. of Cincinnati, held a contract for the exclusive sale of the Davis car in Hamilton County. By the contract they were to be allowed a discount of 27 1/2 per cent from the list price of the cars, with an additional allowance of 2 1/2 per cent in the event fifty cars were purchased during the life of the contract.

On June 23, 1920, one week before the expiration of the contract, the A. & K. Co. is said to have ordered seven Davis cars, which would have completed the quota of fifty; but the Davis company refused to ship the automobiles, and to pay the extra commission of 2 1/2 per cent, amounting to \$4,334.75 on the forty-three cars already purchased.

It is also charged that the Davis company violated the contract by increasing prices without the notice required and by shipping defective cars.

Court Issues Order to Sell Van Briggie

INDIANAPOLIS, Jan. 22—Upon the report of Mahlon Bash, representing the reorganized directors of the Van Briggie Motor Device Co. of this city that the directors were unable to raise sufficient funds to continue the business in operation, Judge Harry O. Chamberlain of the Marion Circuit Court has issued an order directing that the plant and all assets of the company be sold for the benefit of creditors.

The report showed that the reorganization of the company on a sound basis was impossible and that the directors could see no reason for attempting to carry on the business further.

William R. Hirst, receiver of the company, was ordered to remove his office from the plant to cheaper quarters in the downtown district. Creditors of the company will be given six weeks in which to file claims.

Several weeks ago the receiver filed suit against L. H. Van Briggie, president of the company, alleging that he had obtained more than \$240,000 from the company through fraudulent means.

DUESENBERG SUES ON WAR WORK

NEW YORK, Jan. 24—The Duesenberg Motors Corp., one of the Willys subsidiaries, has sued the Government to recover \$1,201,851 on contracts for the manufacture of Liberty motors.

British Companies on Firmer Standing

Balance Sheets of Older Concerns Indicate General Weathering of Depression Period

LONDON, Jan. 5 (*Special Correspondence*)—It is both reassuring and significant amid the undeniably adverse state of the trade that the older British companies look like weathering the financial storm. Now that the balance sheets of some of these businesses are coming through, the reports show both a profit earned in a notably disappointing and vexatious year—vexatious because of the hold up of output at the beginning caused by labor troubles, and the sudden cessation of demand and increasing financial tightness which occurred toward the close.

The Rovers Co.'s profit is a good average, so, also, is the first report of the S. T. D. group—the fusion of the Sunbeam, Darracq and Talbot companies—which group also owns the chief motor trade leaf-spring business, that of Jones, Woodhead & Co. of Leeds, and also the truck and other products business of the W. & G. du Cros Co. The net profits of the S. T. D. group are given as £325,000 (nom. \$1,625,000 pre-war rate) and the cash assets as £560,000 (nom. \$2,800,000 pre-war rate), this item representing 15 per cent of the total assets.

Both the Sunbeam and Darracq outputs were approaching normal, but the Talbot was much below normal, and a new light "four" Talbot model, prepared for the 1920 season, is still in abeyance, though the first samples had been well tested before the 1919 Olympia show. This model has not been dealt with in the press, and here it need only be noted that it seems to be just the sort of chassis for a mass production job likely to sell well here. Probably the fact that the times are inauspicious for such a model explains its being held back. On a 10,000 output yearly the selling value—in normal times, but allowing a continuance of the present wage rates—should be £200 (\$1,000) or with a standard body and full equipment at not exceeding £300 (\$1,500).

Government Work Still on Hand

Napier and Rolls-Royce have done well financially, but as both had Government work on hand it would be difficult to appraise the worth of their general trading.

The Humber company, one of the oldest and most popular British companies, has declared a net profit on the year of £104,218 (nom. \$521,090 pre-war rate), though the net balance, including the sum brought forward from 1919, is a net profit of £215,793 (nom. \$1,078,965 pre-war rate). This company, besides labor troubles, had the further set-back of a big fire which burnt the larger

portion of the body-shop, and as much of the hold-up of motor output in general was due to the shortage of bodies, it can be understood what this loss meant to the company.

The Humber company, like Sunbeam, Rover and Talbot, and one or two others, resumed manufacture of their pre-war models, making detail improvements where economically based and justifiable, so that the lesson of their common prosperity is not far to seek. As regards the Humber result, it should be noted that it includes profits from the company's cycle and motorcycle departments, in both of which it holds a great name and has the advantage of a splendid tradition.

As regards some other established British motor companies, their returns can only be conjectured, and in some cases the accounts are involved with Government orders.

It should also be noted that the present price of the scrip and stocks of some, if not most, British motor companies does not reflect the accepted asset value of the businesses, as can be easily seen by noting the yield as from recent dividends.

Metropolitan Securities Forms Canadian Branch

MONTREAL, Jan. 21—Canada-Metropolitan Securities Corp. has been organized with a capital stock of \$1,250,000, divided into \$500,000 of 8 per cent cumulative shares and \$750,000 common shares, both of the par value of \$10. The special function of the new organization is automobile financing, and it is a link in the chain of the "Metropolitan plan" in the United States. The Confederation Investment Corp., Ltd., is the fiscal agent of the new company. The officers and directors are William F. O'Connor, Ottawa, president; Alexander Michaud, Montreal, vice-president; Major Daniel Owen, Ottawa, secretary-treasurer; R. S. Weir, K. C. Frank, W. Knowlton, T. H. L. Saunderson, Montreal, and H. W. Ritter, Cleveland, directors. The Ritter Commercial Trust of Cleveland, guarantees the preferred dividend for ten years and undertakes direction of the management for the same period, and at the end of the period offer to repurchase any preferred stock which may be offered at par.

FULTON BUYS WELLAND PLANT

WELLAND, ONT., Jan. 22—Instead of St. Catharines as was at first planned, the location of Fulton Motors, Ltd., is Welland and the company will establish a plant here having recently closed an option for the purchase of the land, building and plant of the Canadian Automatic Transportation Co.

AUSTRALIA BARS ALL "BOSCH"

NEW YORK, Jan. 21—Mark Sheldon commissioner of the commonwealth of Australia, announces that a proclamation gazetted Dec. 30 prohibits the importation into Australia of all goods bearing the word "Bosch."

England Shows Gain in Tire Shipments

Imports of Cars, Chassis and Parts to November 30 Reach \$110,092,775

LONDON, Jan. 5 (*Special Correspondence*)—Britain imported in November 1350 cars and 561 chassis, as against 704 and 238 respectively in November, 1919. The total number of imported cars and chassis for the eleven months of the year was 31,916 cars and 11,838 chassis, as compared with 3064 and 1379 respectively for the eleven months of 1919.

The value of the month's imported chassis parts was \$3,204,595, against \$462,935 in November, 1919. For the eleven months the combined value was \$38,603,520, as compared with \$13,377,845 for the like period in 1919. The combined value for the eleven months of the cars, chassis and parts imports was the enormous sum of \$110,092,775, as against \$19,912,780 for the like period and combined totals in 1919.

November's import value of tires was \$2,111,405, as compared with \$1,108,935 for November, 1919; the eleven months' totals being respectively, in 1920, \$25,789,925, and in 1919, \$9,063,135.

These figures, though taken at the pre-war rates of exchange—a fact, of course, responsible for a difference in the gross value calculated at the present unfavorable state of the British pound sterling—very sufficiently show the enormous volume and value of the motor and tire import trade with Britain. Of this combined trade the United States has about eight-tenths, if not more, and the total is increasing.

British exports of cars in November were 814 and of chassis 296, as compared with 198 and 84 respectively in November, 1919. The eleven months totals were 4720 cars and 2835 chassis, as compared with 1296 and 569 respectively for the like period in 1919. The month's value of exported parts was \$920,735, as compared with \$644,850 in November, 1919. The eleven months' total value of parts exported was \$9,029,230, as against \$4,861,095 for 1919. For the eleven months the combined total values of exported cars, chassis and parts were \$37,177,560, as compared with \$11,548,745 for the like period of 1919.

\$400,000 Gain Over November, '19

The value of the British tire exports in November was \$2,409,680, as compared with \$2,083,420 in November, 1919, the respective eleven months' totals being \$30,415,610 in 1920, and \$19,307,990 in 1919.

Britain's most notable export advance, it will be seen, is in tires, the value of which for the eleven months is as 30 to 19, whilst the increased value of exported vehicle chassis and parts is as 37 to 11.3.

War Truck Surplus Requested for Roads

Congress Gets Bill Endorsed by National Association of State Highway Officials

WASHINGTON, Jan. 25—Congressman Frank Reavis of Nebraska has drafted a bill which, if passed, would force the War Department to turn over to the Bureau of Public Roads all surplus motor trucks, tractors, and mobile shop units. The proposed legislation has the support of the National Association of State Highway Officials who feared that the proposal of Congressman Anthony of Kansas to sell on the open market thousands of army trucks and other automotive equipment would be carried out.

Figures have been placed on file with the Chairman of the Select Investigating Committee of the House, purporting to show that \$108,000,000 worth of tractors, trucks and automotive equipment is in possession of the War Department. A large part of this equipment, it is claimed, is surplus and should be transferred to the Bureau of Public Roads where it is urgently needed. Congressman Reavis is advised that there are many tractors and trucks at camps along the Mexican border which are serviceable but not in use.

According to the Select Investigating Committee of the House, the War Department has informed the Bureau of Public Roads that this equipment is not available for their use. It is asserted that the War Department further claimed that manufacturers had protective clauses in contracts which prevented the transfer for other than war purposes.

The Reavis measure would require the States taking this surplus material to pay 20 per cent of the original contract price. With allowances for mileage and other items the cost would be comparatively low. The highway officials intend to push this bill at this session though it is doubtful whether they will obtain any action.

ARMLEDER SUED FOR ROYALTY

CINCINNATI, Jan. 25—Charles Flederman, of Cincinnati, is suing in Common Pleas Court for a judgment of \$14,000 against the Otto Armleder Co., motor truck manufacturer. Flederman says that in 1913 he contracted with the company for its use of an automobile patent issued to him and that he was to receive \$7 for each car manufactured during the life of the patent, as a royalty. He says the company discontinued the royalty when he left its employ in 1915, and that it has used 2000 of the appliances since that time, for which he demands a judgment of \$14,000. The company denies all charges.

TO REVIVE BRIARCLIFF RACE

NEW YORK, Jan. 26—The Briarcliff Race will be revived this year and while no actual date has been set, it is under-

stood that the event will take place in May. The race is under the sanction of the Motor Club which has been absorbed by the Automobile Dealers Association and E. S. Partridge has been appointed Chairman of the Race Committee. The race will be open to stock cars only and it is expected that this revival of a classic will stir up a good deal of interest as racing has practically come to a standstill in the East since the abandonment of Sheepshead Bay Speedway.

Committee Endorses \$100,000,000 for Roads

WASHINGTON, Jan. 24—A bill authorizing the appropriation of \$100,000,000 for Federal aid in the construction of post roads and other highways was reported out to-day by the House Committee on Good Roads. It further provides for an additional sum of \$3,000,000 for national forest roads and trails.

The proposed legislation would allow reduction in the ratio of States where the percentage of total public land area exceeds 10 per cent of the total area of all the lands in the State. This proviso is especially used in Western States.

Would Build D. A. R. Highway

WASHINGTON, Jan. 25—Congressman Zihlman of Maryland introduced a bill to-day providing for a national ocean-to-ocean highway over the pioneer trails to be known as the Daughters of the American Revolution Old Trails Act. It provides that the Government should pay half the cost of constructing and repairing the roads and that no tolls can be levied.

Texas Car Association Is Alleged Bankrupt

FORT WORTH, TEX., Jan. 26—Involuntary petitions in bankruptcy were filed here to-day against the Texas Motor Car Association by Reed & Glasser, consulting engineers of Indianapolis; Maremount Mfg. Co., and Cluley Automobile Supply Co. of Chicago, alleging an indebtedness of \$4,251.06.

The petition says the Motor Car Association, which went into the hands of receivers last October, committed an act of bankruptcy in making such application.

Willys-Overland Cuts Surplus Cars to 7000

TOLEDO, Jan. 24—Surplus car stocks of the Willys-Overland company have been reduced from 12,000 to 7000 in the past six weeks, factory officials declare. It is expected that the remaining 7000 cars will be practically cleared out by Feb. 1.

President John N. Willys looks to a substantial buying movement about March 1. With this realized and the factory operating on a near normal scale, the present inventories of raw material will be worked off in three or four months, it is declared.

Goodyear Financing Nears Final Stage

Negotiators Report Satisfactory Progress Toward Working Plan —Seiberling Not Resigned

NEW YORK, Jan. 27—Negotiations for the reorganization and refinancing of the Goodyear Tire & Rubber Co. are continuing without interruption, but no official statement is obtainable concerning them except that "satisfactory progress" is being made. Something definite may be evolved by the last of this week. Bankers interested assert that a receivership now is improbable. It seems likely a plan will be worked out for mortgage bonds to take care of the secured creditors, which means the banks.

Merchandise creditors are not satisfied with the proposition made to them which calls for a certain amount of their claims in cash and the remainder in bonds or stock. They want cash and notes, on the theory that notes can be discounted. The merchandise claims amount to approximately \$70,000,000. It is understood, however, that the various interests involved are getting closer together and that an ultimate agreement is considerably more likely than it was a week ago.

F. A. Seiberling, president of the company, has been in New York for several days, sitting in at the conferences, and he emphatically denies that he has resigned or contemplates doing so. He insists that the story of his retirement, either forced or voluntary, has been inspired by a banking house which is disgruntled because he would not meet its terms, which were tantamount to giving it complete control of the company. It is probable, however, that if the refinancing plan goes through, a representative of the bankers will be placed in charge of the company's finances.

May Limit Fund to \$25,000,000

Plans which the bankers are working on are said to contemplate the raising of not more than \$25,000,000 new money, and possibly not more than \$20,000,000, in place of the \$30,000,000 previously mentioned. The distribution of this fund has not been settled upon, but it was said yesterday that it was not likely any of it would go to merchandise creditors.

The latter are being grouped into two classes. Those who have claims against the Goodyear Tire and Rubber Company for goods delivered, and those whose claims rest on contracts. It was understood that the former would be asked to accept new securities for their claims, and that the latter would be able to liquidate the goods they have on hand for delivery and receive new securities for whatever readjustment is necessary. These securities, it was hoped, would be available for collateral purposes, so that creditors may be able to borrow on them.

Wills Distribution to Start in March

Five Body Models in First of Line
—Production for Year Estimated at 6500

(Continued from page 187)

the car which, with body and all accessories, barely exceeds 3000 lb., coupled with the high torque engine, gives a very creditable performance.

The car is being made at present in five body models, these being the five passenger touring, roadster, coupé, sedan and town car. The touring and roadster models will be put through first, the roadster being ivory with Sainte Claire blue fenders. The color is named after the blue of the fresh water lakes, which is also incorporated in the symbolic nameplate or trade mark on the car. This is a wild northern goose winging its way over the pine clad shores of the lake region. The touring car is dark blue throughout, the fenders and running gear having the same color as the body. All of the cars are equipped with disk wheels of a special design as standard equipment and no options are being offered on this. The wheels are special design with a convex rather than a concave disk. The wheels and bodies are at the present being made by the Budd company and the trimming is done at the Marysville factory.

In lines, the car presents a rather low appearance, the front view being rather square due to the rectangular radiator, with a very slightly raised center. Mechanically the car presents a number of very unusual features. For instance, the three-bladed, cast aluminum fan is designed to cut-out at high speed so as not to absorb an undue amount of engine power. The headlights, which are unusually powerful, are small and are equipped with magnetic tilting control from the steering column, the tilt is affected by rotating a hard rubber milled piece just below the horn button. The tail lights are double, one being a bright light which is automatically thrown in when the car is put in reverse to give a brilliant back light for driving backwards at night. There is also a lamp on the side of the car which illuminates a circle to the left of the car, making it possible to kill the glare of the headlights or to provide an illuminated area for working on tires, etc., at night.

Leading Distributors Named

The merchandising plan for the product, which has been worked out for the present, embraces a production of between 6000 and 6500 for 1921. Dealers have already been appointed for the New England, New York, Philadelphia, California and Chicago territories. A dealer for the Detroit territory will be appointed within the next 90 days. Deliveries to the dealers will be made during the last half of February. The New England dealer is the Fay-Allen Co.; the New York dealer E. B. Jackson, who

recently resigned as sales executive for the Willys-Overland Co. The Philadelphia dealer is F. W. Foss; the Chicago dealer, Dayton Keith, and the California dealer, the Western Motors Co.

C. H. Wills & Co. was incorporated July 6, 1920, as a Delaware corporation. The officers of the company are C. Harold Wills, president; John R. Lee, vice-president; Kirkland B. Alexander, vice-president; Charles Morgana, vice-president; Frank P. Book, treasurer; Ferris D. Stone, secretary; George S. Anderson, assistant secretary and assistant treasurer. The financial matters of the company have been handled through the National Shawmut bank, Kidder, Peabody & Co., and F. S. Mosley & Co., all of Boston, Mass.

To Keep Stock From Market

No stock has been placed on the market or is it anticipated that any will be. The first unit of the factory has been completed and the heat treating plant is under erection at the present time. These two have a combined floor space of 221,400 sq. ft. The concrete foundations for the second factory unit have been laid and it will be completed after production has reached more than 75 per day, which is the capacity of the first plant. Production will start during February at the rate of 10 per day.

Maxwell Suit Filed to Aid Merger Plan

NEW YORK, Jan. 24—The creditors' suit recently begun in Federal district court in Detroit by the Jenks & Muirs Mfg. Co. against the Maxwell Motor Co. Inc., was filed for the purpose of carrying out the reorganization plan for the Maxwell and Chalmers companies through the transfer of the assets of the present company to the new corporation, it is learned from Maxwell attorneys.

The court is asked for an injunction restraining creditors from interfering during the pendency of the suit for the establishment of claims of creditors and assets. If the petition is granted, as it is confidently expected it will be, there will be no necessity for equity receivership proceedings preliminary to the reorganization and consolidation of the new companies which now are backed by ample working capital.

BOWSER OFFICERS CHANGE

FORT WAYNE, IND., Jan. 22—S. B. Bechtel, vice-president and general manager of S. F. Bowser & Co., Inc., manufacturers of gasoline and oil storage systems of this city, has announced several important changes in the executive positions of the company.

W. G. Zahrt, who has been treasurer and assistant general manager, has been named as vice-president and assistant general manager. The treasurership thus vacated has been filled by the appointment of D. G. Milligan, assistant treasurer. J. R. Matlack, who has been executive assistant, has been advanced to the position of assistant to the general manager. R. L. Heaton has been named as assistant to the general manager.

Turcat-Méry Goes Into Liquidation

Failure Surprises French Industry—Ballot to Make Special Sporting Car

PARIS, Jan. 15 (*Special Correspondence*)—One of the oldest of the French automobile companies, for it was established in 1899, the Turcat-Méry of Marseilles, has gone into judicial liquidation. The original capital of the company was 525,000 francs. At the beginning of 1920 the capital stood at 1,050,000 francs, but during the year it was increased to 2,100,000 francs. In June of last year new stock was issued and the capital increased to 3,000,000 francs. At the same time 2,000,000 francs worth of 6 per cent bonds were issued, and three months later another 1,000,000 francs worth of similar bonds were put out.

This failure comes as a surprise, for Turcat-Méry was looked upon as a very sound organization. The volume of business was not big, the output never exceeding 800 cars per year, but the firm enjoyed a good reputation. Leon Turcat, managing director of the company, is treasurer of the Paris automobile show committee.

The Ballot company is involved in the failure of the Turcat-Méry concern, for the cars of the latter company were all fitted with Ballot engines, and big quantities had been delivered before the liquidation went into effect. Ballot is also affected by the liquidation of Sizaire-Naudin, another old established automobile company, and by the financial difficulties of the Sigma company. This latter concern, which made use of Ballot engines and transmissions, has not gone into liquidation, but is in such financial difficulties that practically all production is stopped. Ballot has reduced his normal staff of 1200 to 100 men. It is stated on good authority that Ballot will shortly produce a special sporting, semi-racing type car of 122 cu. in. piston displacement. This firm being one of the biggest producers of engines for car assemblers, there is no intention of producing complete cars on a big scale, but activities will be confined to the special semi-racing type.

Berliet to Make Rail Truck

Berliet is negotiating with the French Government for the delivery of important quantities of narrow track locomotives fitted with gasoline motors. The truck motor will be used. This firm is trying to relieve its present financial position by the sale of all surplus stocks of raw material.

The Zenith Carburetor Co., after having cut down its staff at Lyons factory from 1200 to 900 men, announces that it expects to be at work with a full force within three or four weeks. The firm has produced a new carburetor, a small number of which have been delivered for experimental purposes.

Cuban Ports Tied Up, Exporters Warned

Mexico Best Latin-American
Field Now for Cars, Says
Southern Shipper

NEW ORLEANS, Jan. 21—Warning to manufacturers and exporters of automotive vehicles of all kinds, as well as to all American exporters of other manufactured products, to "go slow" on shipments to Cuba; to get payment for their shipments while the shipments are still in the United States, and to ship only by established steamer lines, rather than by "tramps," was issued today by L. J. Folse, Jr., of New Orleans, president of the Marine Forwarding and Shipping Co., a leading factor in Latin-American trade from all the Gulf ports, and a prominent official of the New Orleans Association of Commerce.

"Latin-America, with the unusual development of good roads as transportation aids now being done by many of the governments there, is becoming one of the best fields for the automobile, truck and tractor manufacturer and exporter, but if that manufacturer and exporter is not to meet with loss and often failure in those fields, he must study them carefully," said Folse.

"At the present time, Mexico is the best field for American exports of all kinds, including passenger cars, trucks and tractors, while only a few hundred miles to the east lies Cuba, probably the most dangerous and the worst field for all kinds of exports.

"Shipments of automobiles, trucks and tractors, along with other exports from the United States and other countries, are being refused by Cuban consignees and allowed to lie unprotected in lighters or on unroofed wharves, since the congestion in all the ports precludes movement of shipments to warehouses or to other protected places. This congestion is true of the outside ports as well as of Havana, and the Cuban importers, refusing to take out their consignments, naturally are not helping in this freight movement.

Should Avoid Tramp Lines

"Automobile exporters especially should be extremely careful, in making shipments to Cuba, to ship only by established steamer lines, which have terminal and warehouse facilities at Cuban ports, in which such shipments can be left in safety from thieves, and protection from the elements, until received by the consignee.

"Conditions in Porto Rico, on the other hand, are excellent. Money is more plentiful than it has been for some time, and there is no port congestion.

"It is in Mexico, however, that conditions, both financial and commercial, are the best for the automobile exporter of all the Latin-American countries. The paper money issued by the various revolutionary government has been virtually all absorbed, and gold and silver coins

are in circulation, putting the country on what is practically a metallic basis, with the coinage intrinsically worth more than its nominal value. There is no congestion at the ports and labor troubles, which threatened for a while, have been eliminated. An unusually extensive policy of good-road building has just been inaugurated by the federal government."

S. A. E. Tractor Meeting Set for February 10

NEW YORK, Jan. 27—The annual tractor meeting of the S. A. E. will be held Feb. 10 in Columbus, Ohio, during the week of the National Tractor Show there. The program of the convention is as follows:

Technical Sessions, Hotel New Southern,
10 A. M. and 2 P. M.

E. A. Johnston, Chairman

John Mainland—Report of Committee on
Pulley Widths and Speeds.

O. W. Sjogren—Nebraska State University,
Tractor Test Results.

E. A. Johnston—Trend of Tractor Design.

D. L. Arnold—Report on Investigation of
Plowing Speeds.

Columbus Dinner, Hotel Deshler, 7 P. M.
Fred Glover, Toastmaster.

SPEAKERS

W. H. Stackhouse, President, National
Implement & Vehicle Association.

L. J. Taber, Master of Ohio State Grange.

J. B. Davidson, Secretary American Society
of Agricultural Engineers.

Iowa Car Maintenance Exceeds Corn Value

DAVENPORT, IOWA, Jan. 22—Value of Iowa's 1920 corn crop, the greatest in the State's history, was \$20,000,000 less than the cost of Iowa's automobiles for the same period, according to estimate prepared by L. A. Andrews of Ottumwa, president of the State Bankers' Association. Automobile registry fees alone, he pointed out, will amount to more than receipts from 270,000 acres of timothy seed and 134,000 acres of clover seed, and the total of spring wheat standing on 400,000 acres will lack \$1,500,000 of registering State automobiles.

Last year 437,265 cars paid the State \$7,414,548.98 in registry fees and dealers paid an additional \$92,653.10 for their numbers. Upkeep of these cars ran to \$260,000,000. The corn crop was valued at \$222,686,000.

HOLT EMPLOYEES AGREE TO CUT

PEORIA, ILL., Jan. 22—Employees of the Holt Mfg. Co., after conference with officials, have agreed to accept a cut of 15 per cent in wages in thirty days. Wage scales at the time of closing the plant will continue during the month.

Manager M. M. Baker in announcing results of the conference said: "The men promise a 25 per cent increase in productivity and on our part we agree not to suggest any further wage reductions for a period of six months."

Big Future Trade Likely in Siberia

Promoter Would Have American
Interests Send Representative
to Study Territory

SEATTLE, Jan. 21—While there is to-day no possibility of doing any business because of the almost worthless level to which the ruble has descended and on account of the unsettled political conditions, American manufacturers of automobiles and tractors should join in sending a representative to Siberia at this time if they are to share in the tremendous trade that will develop when the big "opening up" occurs. This was the declaration of Waldemar Toritch, former president of the once powerful Timbermen's Association of Siberia and now connected with several enterprises in Siberia, who is on a brief visit to this country. Toritch left Vladivostok about six weeks ago.

British, French and other European manufacturers have trade investigators of a high caliber on the ground, and have had for some time, said Toritch. These representatives are laying the foundation for obtaining a generous share of the orders when it is possible to accept them. On the other hand, the visitor declared that American manufacturers appear to be entirely overlooking the urgency of being represented in Siberia now, despite the fact that no business is immediately forthcoming.

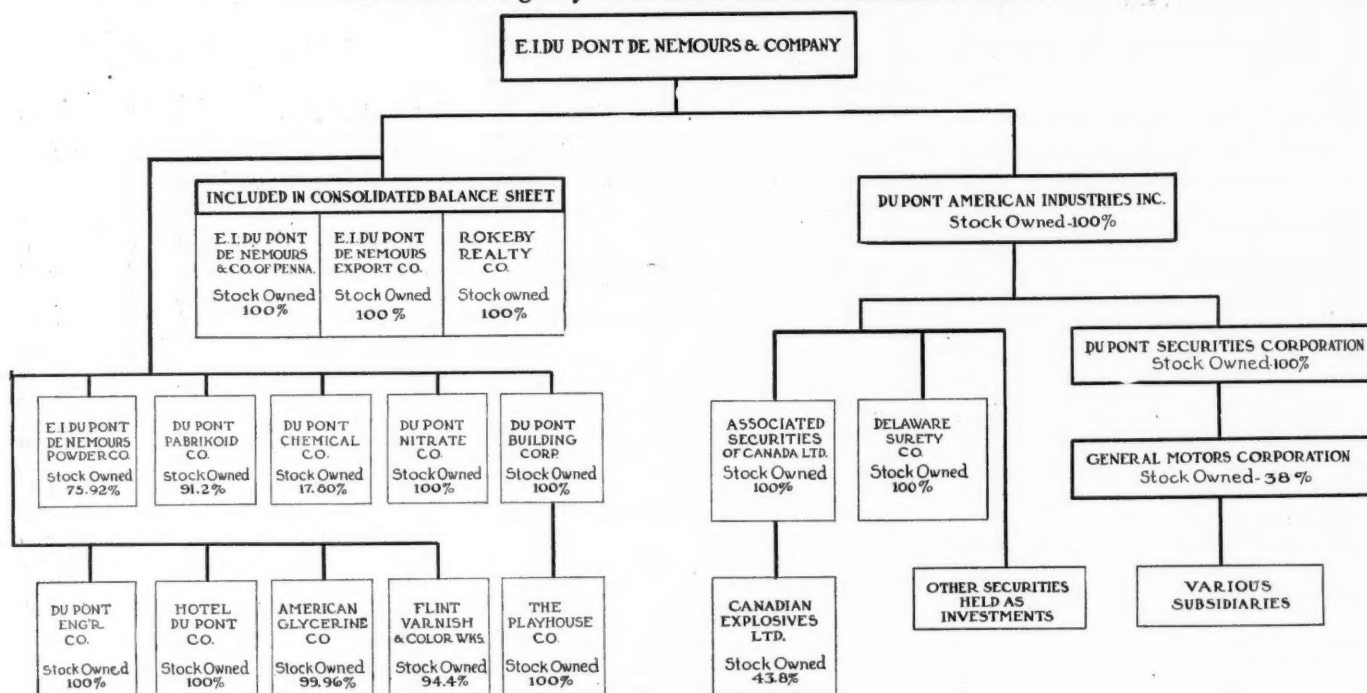
Because of the deteriorated state in which the railroads are in, there will be an enormous demand for automobiles of all classes in Siberia when trade can be resumed, said Toritch, and the Europeans are actively preparing to act as the suppliers.

Toritch has witnessed with marked interest the increasing use to which tractors are being put in the great lumbering industry of the western part of the United States, and believes that when the development of the timbering industry of Siberia is undertaken tractors will be in great demand. Toritch declared that the forest stands in four of the leading provinces in eastern Siberia covers 156,377,725 acres. At the present time Siberia is not consuming 1 per cent of its standing timber. There is not now a single mile of logging railroad in Siberia, said Toritch, so that forests situated over sixteen or seventeen miles from the water are absolutely untouched.

WOULD BUY CHILLICOTHE PLANT

CHILLICOTHE, OHIO, Jan. 24—Stockholders of the Chillicothe Rubber Co. have been asked to consider a proposition made by the Ultimate Tire & Rubber Co., Cleveland to take over the plant here. The Cleveland company, capitalized at \$2,000,000, has sold a large part of its stock but has no plant of its own at present. Another meeting of the Chillicothe stockholders will be held late this month to vote on the question.

Main Holdings of E. I. du Pont de Nemours & Co.



This chart shows the main ramifications of the DuPont interests where the various members of the family have banded together but it does not indicate in any way the investments of the various members of the family as individuals. These investments run far into the millions and make the men who now control the General Motors Corp. one of the strongest groups of financiers in the world

Eisemann Consolidation With Recording Pends

DAYTON, OHIO, Jan. 24—Negotiations for the consolidation of the Recording & Computing Co. of this city and the Eisemann Magneto Corp. of Brooklyn under the name of the Ohmer Corp. have not yet been completed according to Will I. Ohmer, president of the Recording Co. The plants of the company here were used for war work and when hostilities ceased, they decided to go into the production of automotive parts. One of the most important of these will be magnetos. Other devices will be a combination magneto and generator for trucks, a starting motor and a generator. Considerable difficulty has been experienced in obtaining castings and machinery.

The Eisemann magneto is used as standard equipment by more than 125 automotive companies. It also manufactures other devices for motor vehicles. The company has no factory of its own but occupies under lease 100,000 sq. ft. in one of the Bush Terminal buildings in Brooklyn. It has service stations all over the United States, Cuba, South America, the Philippines and Hawaii.

SINGER LIABILITIES \$103,998

NEW YORK, Jan. 21—Schedules in bankruptcy filed by the Singer Motor Co. of Mount Vernon disclose liabilities of \$103,998, of which \$42,066 are secured claims. The assets are listed as \$114,460, book value. The assets are divided as follows:

Stock, \$42,621; chassis held as security for loans, \$11,973; apparatus, \$17,596; furniture and fixtures \$2,184; stocks, at

par, \$2,600; deposits, \$35,284, and accounts, \$2,199. Among secured creditors are Columbia Trust Co., \$20,000, and Clinch Valley Coal & Iron Co., \$19,556. Among those unsecured are Mount Vernon Trust Co., \$8,000; Pacific Bank, \$6,926, and Westinghouse Electric & Mfg. Co., \$4,871.

Continental Motors Shows Higher Earnings

DETROIT, Jan. 21—The net profits of the Continental Motors Corp. during the fiscal year ending Oct. 31, 1920, were \$3,567,504 compared with \$3,425,725 in 1919. Including the surplus, the balance was \$7,395,202 compared with \$4,981,335 the year before. After deducting dividends, the net surplus was \$6,345,309 as against \$3,827,698 the year before. The total sales were 15½ per cent in excess of the previous year. The orders on the book at close of the fiscal year totalled \$53,584,220 or 64 per cent more than at the end of the previous year.

SAGINAW PRODUCTS PICK UP

SAGINAW, MICH., Jan. 22—The various plants which make up the Saginaw Products Co. and are a part of the General Motors Corp., are gradually although slowly resuming operations. In a statement by General Manager George H. Hannum, he said there are about 400 men, 25 per cent of the normal number, now working at the motor plant; 100 or about 20 per cent, at the malleable plant; about 10 per cent of normal force at the foundry, while the Jacox or steering gear plant is likely not to reopen until Feb. 1, or even the middle of the month.

To Show New Renault at New York Branch

NEW YORK, Jan. 25—G. Baldenweck, general manager for Renault automobiles in America, announces that he will have on exhibition at New York showrooms next week a 10 hp. Renault car.

This car was recently referred to in a cable from Paris to AUTOMOTIVE INDUSTRIES as containing some features of the American Ford. Baldenweck says that this is not correct, also that the statement that the model has been withdrawn and a 12 hp. substituted, was an error. In this connection, Baldenweck writes:

"Referring to your article which was published Nov. 4 on the subject of Renault cars, I am directed by our factory in Billancourt, France, to advise you that our 10 hp. car is not, by any means or design, either a copy of the Ford automobile or a copy of any other car. It was completed and delivered in France a short while ago and there are now over 5000 of these cars in circulation, not only in France but in foreign countries, and this is our best proof that the car in question is giving all the satisfaction expected to motorists."

"Further, instead of upholding the manufacture and production of this car, we are proceeding normally to its construction and we have the approval of our customers, who have sent us numerous orders, not only direct to our plant, but through our various agencies."

It may be interesting to know that there is on exhibition at the New York showrooms the first Renault model built by the company.

No Barrier Found to Tire Sale Here

**A. E. F. Stocks Now Offered to
American Dealers—Surplus
Totals 360,000**

NEW YORK, Jan. 26.—The lack of legal provisions forbidding the re-importation into this country of surplus army tire stocks in France, probably means, according to General Manager Viles of the Rubber Association of America, that all of these tires intended for army use abroad soon will be landed in America and offered for sale to American buyers.

Cable despatches have indicated that there were approximately 200,000 pneumatic tires and 160,000 solids, and a presumably large supply of inner tubes. Of this number, Viles said, all but about 55,000 pneumatics and 80,000 solids had been bought by representatives of American jobbing syndicates to a recent date and the remainder have probably been purchased by now.

Thousands have been sold already to American tire dealers by the jobbing syndicate, operating in New York and Newark, N. J. The tires are of five standard American makes. Though they are unused, they are not new in the sense that they have been manufactured several years and consequently have suffered deterioration through aging. Manufacturers have declared their intention to deny the usual adjustment privileges.

Manufacturers do not anticipate any particular slump in the market owing to the absorption of this supply, but there has been considerable annoyance expressed that there has been no legal barriers to prevent this surplus being sold here.

INLAND ACQUIRES SHURNUFF

ST. LOUIS, Jan. 22.—The Inland Machine Works has absorbed the Shurnuff Mfg. Co. and will continue the manufacture of its products which include a spark plug, combination manifold, grease retainer, runningboard support and a heater. Former prices will be continued. Sales are made only through bona fide jobbers.

Stockholders of the Shurnuff company are now stockholders in the Inland works, and two directors of the former company are now directors on the Inland. One of these is John F. Shuford, well known to the jobbing trade.

AMERICAN METAL TO BUILD

MILWAUKEE, Jan. 24.—In view of substantial improvement in the demand for its products, and more favorable conditions in building construction and equipment markets, the American Metal Products Co. has decided to proceed immediately with the erection of a new foundry and machine shop in West Milwaukee. The work was projected about

six months ago but held in obedience until now. The main shop will be 80 x 225 ft., and equipped with new electric furnaces for manufacturing Ampco bronze bars, rounds, castings, etc., under patented processes. Officers of the company are: President, George F. Staal, city engineer of Milwaukee; vice-president, W. J. Eberle; secretary-treasurer and general manager, Carl J. Zaiser.

Blekre in Production on High Grade Tire

ST. PAUL, MINN., Jan. 26.—Production has been started in the new plant here of the Blekre Tire & Rubber Co., organized with a capitalization of \$4,500,000 to manufacture high grade cord and fabric tires and tubes. The plant has a capacity of 2000 tires a day and will employ 250 operatives. The company will devote itself entirely to high grade product and will not enter the medium grade field.

The formation of the company is the outcome of the growth of a small tire jobbing business started by E. O. Blekre, three years ago in Sioux City, Iowa. Through the expansion of this business the Blekre Tire & Rubber Co. was formed to manufacture and market its own product and St. Paul was selected as the manufacturing site.

Officers of the company are E. O. Blekre, president; S. E. Blekre, vice-president and treasurer; G. W. Wells, secretary; S. A. Rheinstrom, vice-president and general sales manager; G. O. Ludcke, advertising manager, and W. E. Greer, superintendent.

ERDMAN-GUIDER GETS GOING

SAGINAW, MICH., Jan. 22.—Erdman-Guider Co., which operates a large body making plant here and another in Detroit, is preparing to increase its production, due to the satisfactory business transacted at the show by some of its customers. The company employs normally about 350 men, the local plant giving employment to more than half. The company specializes on closed bodies and its total production capacity is about 5000 for its two plants.

COTTON STATES RUBBER FORMED

ATLANTA, Jan. 24.—With a capitalization of \$500,000 and authority to increase to \$2,000,000, the Cotton States Rubber Mfg. Co. has been incorporated here by J. B. Anchors, R. W. Ragin and G. J. Reuter. The company states in its petition for a charter that it will manufacture automobile tires and tubes.

WILSON FOUNDRY TO RE-OPEN

PONTIAC, MICH., Jan. 24.—The Wilson Foundry & Machine Co. expects to resume operations not later than the first week in February, according to the statement of the vice-president and general manager D. R. Wilson. Inasmuch as this concern is one of the units of the Willys-Overland Co., it probably means an early increase in activities at the Willys-Overland in Toledo.

METAL MARKETS

SOME of the smaller interests among the

Independent steel producers are sounding consumers with a view to ascertaining whether price concessions would lead to the placing of orders without delay. Steel men, large and small, are unwilling to cut prices if their doing so results merely in lowered quotations without increasing buying activity. Sales managers are, therefore, exhausting their resources of diplomacy to make certain that tonnages are actually ready to be ordered before they compete actively for the business and, in a market condition like the present one, competition revolves almost solely around the price. A cut of \$3 a ton under the general market was secured in this way on a tonnage of sheets bought by the Standard Oil Co. a few days ago. In the case of the smaller steel finishing plants the human element enters strongly into their anxiety for sufficient orders to keep their plants at a fair rate of operation. In a large plant it is relatively easy, even in a period of quasi-idleness, to keep the vital parts of the organization intact, whereas the burden of "overhead," in keeping skilled overseers, superintendents and foremen on the payroll, when the wheels are not turning, is considerable in the case of small plants. Some of the automobile sheet mills in the Ohio valley, however, are "sitting tight" in the matter of prices for another reason. These are the sheet makers who depend upon others for their supply of bar stock. They contend that, if they have to pay \$47 for sheet bars, they must get twice as much for finished sheets, or a base price of 4.75c. Instead of the prevailing quotation of 4.35c. So they are seeking to bring all possible pressure to bear on sheet bar mills to lower their prices. Odd lots of furnace coke are reported to have been sold in the last few days at as low as \$4.50, which marks another recession of 50c. This should serve to expedite further readjustment in the pig iron market, which remains in much the same position as last week, offers of No. 2 foundry at \$30, valley, continuing with occasional reports of odd tonnage sales at below that level.

Pig Iron—Automotive plants continue to operate largely on old reserves, and furnaces have been asked to hold off a few weeks more before resuming shipments on suspended tonnages.

Steel—Cold-rolled strip steel plants operate largely on old orders on which suspensions had been requested. No marked quickening in activity is looked for until automotive consumption increases. Although reductions on structural and boiler rivets have been announced, quotations on rivets used in the automotive industries remain nominally unaltered, but the market for rivets, as well as bolts and nuts, may be characterized as very easy.

Aluminum—The sole American producer's spot quotation for 50-ton lots of 98 to 99 per cent virgin ingots is now 28c., and for No. 12 alloy 27.30c. These prices denote an average reduction of ¼c. a lb. There are reports in the "outside" market that some automotive interests, apprehensive of an advance in import duties, have taken on some of the imported metal that was offered at 22½c.

Copper—In spite of curtailed production and some hand to mouth buying, the heavy surplus is being added to daily. In other words, there is still more copper produced than consumed. Hence the market's weakness.

Brass—The leading interest has reduced, effective January 20, its extras on a number of products 25 per cent. The War Department will re-offer 47,751,838 lb. of cartridge case brass, having canceled an award of this material recently made.

FINANCIAL NOTES

Martin-Parry Corp. has declared the regular quarterly dividend of 50 cents a share, payable March 1. Net income of the company for the ten months ended Oct. 31, 1920, was \$378,000 after all charges, including Federal taxes. The company has current assets of \$1,672,000, of which about \$126,000 is cash in bank. Current liabilities are about \$10,000. There are no outstanding notes and all inventories have been written down to present market values.

McCord Mfg. Co., Inc., reports 1920 sales as \$15,257,672 and net earnings before Federal taxes, but after inventory adjustments, above \$802,000. The great bulk of the inventory stands as sold material, therefore writing down will be very small. Operations were two-thirds of normal in November, but only 40 per cent in December.

Standard Die Casting Co. of Milwaukee has been incorporated with a capital stock of \$100,000 to engage in the manufacture of dies, die castings and similar articles. The owners are the principal stockholders and officers of the Charles Jurack Pattern Works.

Lumen Bearing Co. will increase its capitalization from \$200,000 to \$500,000, of which \$100,000 will be issued to stockholders as a stock dividend of 50 per cent. The balance of the new issue is to be used to take care of expanding business.

Lee Rubber & Tire Co. reports earnings for 1920 before deducting \$225,000 dividends were about \$510,000, without taking into account inventory write-off. On Dec. 31 the company owed banks \$400,000 and had over \$300,000 cash in banks.

Sterling Motor Truck Co. of Milwaukee, manufacturer of Sterling trucks, has increased its authorized capitalization from \$250,000 to \$1,000,000. Arthur C. Wollensak is chief engineer.

Charleston Steam Tractor & Truck Mfg. Co. has filed notice of an application to change its name to the Automoto Mfg Co., and to increase its capitalization from \$1,000,000 to \$2,000,000.

King Motor Car Co. has about \$1,500,000 net assets with no bonded indebtedness, no notes out, and only a few small bills unpaid, according to General Manager Weber.

Kelly-Springfield Tire Co. has declared a quarterly dividend of \$2 a share on the 8 per cent preferred stock of the company, payable Feb. 15.

Miller Rubber Co. gross sales in 1920 were \$32,891,670.22; an increase of \$5,775,081.89 over 1919, or 21 per cent.

Federal Motor Truck Co. has passed its monthly dividend.

Hamilton Motors Add Two New Truck Models

GRAND HAVEN, MICH., Jan. 22—Two new models are announced by the Hamilton Motors Co., a 1-ton speed truck and a 3½-ton truck. The 3½-ton model is very similar in design to the 1½ and 2½-ton Apex trucks, the only difference being in the dimensions of parts. It comprises a Buda 4½ x 6-in. engine, a Fuller 4-speed transmission amidships, a Torbensen rear axle with external service and internal emergency

brake, a Shuler front axle, Blood Bros. universal joints and propeller shaft, G. & O. radiator, Stromberg carbureter, Eisemann magneto, Auto-Lite generator and Lavine steering gear.

The frame is of 7-in. rolled channel steel, ¼ in. thick and with 2¾-in. flange, and is suspended on half-elliptic springs. The wheelbase is 160 in., the front tread 65 in. and the rear tread 67 in. Wheels are of the wood artillery type, 36 x 5 in. front and 36 x 10 in. rear. The loading space is 168 x 72 in. The standard equipment includes a driver's seat, electric generator, electric head lamp, front fenders, tool box, tools, jack and Alomite grease outfit. The truck will develop a speed of 22 m.p.h., it is claimed.

On the 1-ton speed model, a Lycoming 3½ x 5 in. engine is used, together with a Borg & Beck clutch, Muncie transmission, Torbensen axles, Lavine steering gear, G. & O. radiator, Stewart vacuum feed, Stromberg carbureter and Auto-Lite starting and lighting equipment. The frame of this model consists of 4-in. rolled channels, and is supported by half-elliptic springs both front and rear. The wheelbase is 130 in. and the tread the standard 56 in.

The 3½-ton model lists at \$3,975 and the speed model at \$1,695, both for chassis with seat.

Commonwealth Directors Re-elected to Positions

NEW YORK, Jan. 24—Directors of the Commonwealth Finance Corp. were re-elected by large majorities at the annual meeting of stockholders. This is regarded as a vindication of the management of the company in the face of an attempt by one faction of the stockholders to have the present management ousted. It is considered probable that the temporary receivership, against which the company was granted a stay, soon will be lifted. After their election the directors elected the following officers: President, Henry D. Tudor; vice-presidents, Charles C. Dickson, Charles W. Thomas and Theodore L. Weed; secretary and treasurer, N. A. Merritt. The directors include the officers and Harry L. Burrage, George McAneny and Karl Goldsmith. The board is the same except that Weed takes the place formerly held by Ormsby McHarg, who instituted the legal proceedings resulting in the receivership and who preferred charges of malfeasance against the present management.

POWELSOHN DEBTS REDUCED

ROCHESTER, Jan. 24—Stockholders of the Powelsohn Foundry & Machine Co., Inc., manufacturers of automobile valves, pistons and wrist pins are apprised of the financial condition of the firm in a report just filed by the committee appointed at a meeting of creditors. According to figures submitted, the accounts payable on Oct. 1 were \$38,953.29, and notes payable totaled \$36,006.71. On Nov. 1 the accounts payable totaled \$17,813.67 and the notes payable, \$18,857.57.

Bank Credits

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Jan. 27—The stock market last week was irregular, with a downward tendency the latter part of the week after withdrawal of professional support. The bond market, on the other hand, gave indications of continued strength. There was a general advance, with some high grade bonds gaining as much as four or five points. Liberties and tractions were the most active issues. The new \$30,000,000 8 per cent Belgian Loan was quoted last week on a "when issued" basis at a full point above par. Continued improvement in bond prices, which is generally expected to result from easier money, may be checked by further flotation of high-coupon-rate foreign issues, of which there are said to be a number in prospect. The foreign exchange market was the most prominent of the speculative markets.

The removal in Canada last week of the embargo on the importation of foreign held securities is significant, in that foreign held Canadian securities may form the medium of payment for Canadian exports, thus serving in a measure to divert Canadian trade from the United States to Great Britain, where Canadian securities are extensively held.

The recall of funds by interior banks and the continued withdrawal of Government funds were probably responsible to a great degree for the hardening of money rates last week. This is reflected in the large rediscounts and the decline in reserves of the New York Federal Reserve Bank. Call money, which had ruled at 6 per cent earlier in the week, rose to 7 per cent for renewals on Thursday and has since continued at that figure. The time money market was quiet with a 6 per cent rate quoted for all maturities up to six months. This rate compared with 6 per cent for maturities up to five months and 5½ to 6 per cent for six months' paper the week before.

A decline in the reserve position of the New York Federal Reserve Bank was partly a result of an increase in reserves held for private banks and of withdrawals by interior institutions. Gold reserves declined \$37,495,000, and total cash reserves declined \$36,001,000. Total bills on hand increased \$50,372,000, and total earning assets increased \$37,734,000. Federal Reserve notes in circulation declined \$7,096,000.

The Federal Reserve banks as a whole continued the recent marked improvement in reserve position. Federal Reserve notes in circulation declined \$44,181,000. The actual circulation at \$3,115,310,000 was \$289,600,000 less than it was only four weeks ago. Total gold reserves increased \$10,315,000. As a result, the ratio of gold reserves to Federal Reserve notes in circulation, after allocating 35 per cent against net deposits, increased from 54.8 per cent to 55.6 per cent. While total earning assets declined \$27,016,000, net deposits increased \$33,061,000.

MEN OF THE INDUSTRY

Fred L. Good has assumed new duties as general sales manager of the Ogren Motor Car Co., Milwaukee, manufacturing the Ogren. Good retires as sales manager of the Wisconsin Automobile Sales Co., state distributor of the Jordan, after two years' service. He has been connected with the automotive industries for twenty years, having been associated in engineering capacities with Ford and Cadillac.

W. D. Crouch, formerly in charge of sales for Robertshaw temperature controllers in industrial plants, has been made general sales manager of both the domestic and industrial departments. The headquarters of the sales manager of the industrial department have been moved from New York to Youngwood and consolidated with those of the domestic department. John A. Robertshaw has been appointed New York representative and will have charge of Eastern interests.

C. C. Clay, for the past year sales manager of the Samson Tractor Co., Janesville, Wis., has retired to resume his previous connections with the Chevrolet Motor Co. of Atlanta. He is succeeded at Janesville by Hugh M. Craig, with the title of acting general sales manager, pending a permanent appointment. Craig has been assistant to Clay, and he is a nephew of J. A. Craig, president and general manager of the Samson company.

David Rosenbach, formerly president of the Motor Equipment Co., which recently discontinued business, has been appointed general field secretary of the Automotive Equipment Association. He was a jobber for five years, sales manager for the Rayfield carburetor for many years, and for four years was president of the Overland Sales Co.

C. R. Lester has resigned as general service manager of the Packard Motor Car Co., taking effect Jan. 17. Lester has occupied this important position for a number of years and has been largely instrumental in building up the system and personnel of the Packard service organization. He is one of the pioneers in the automobile business.

Hiram Walker has been appointed chief engineer of the Chandler Motor Car Co. Walker has been with Chandler for several years and his many friends will be pleased to learn of his promotion. He succeeds J. V. Whitbeck, who will now devote all his time to the Cleveland Automobile Co., he being president of that company.

Edmund T. Boland, formerly works manager of the Kissel Motor Car Co., Hartford, Wis., and more recently in charge of operations of the Clintonville (Wis.) Tractor Co., has become associated in a similar capacity with the Theodore Armleder Co., Cincinnati, manufacturer of Armleder motor trucks.

John N. Mowery has been made general manager of the Worcester Pressed Steel Co. He has had a wide manufacturing experience, having formerly been plant engineer with the Chester Shipbuilding Corp. and more lately connected with the McDougall-Duluth organization.

F. W. Fenn, secretary of the motor truck committee of the National Automobile Chamber of Commerce, delivered two lectures this week to the seniors of the University of Michigan, who are taking the course in transport engineering.

Hugh R. Corse has been made sales engineer of the Lumen Bearing Co. For the past six years he has been general sales manager of the Titanium Bronze Co., and previous to that had been manager of the Lumen office in Detroit.

Robert M. Eames has been appointed general sales manager of the Bryant Electric Co. to fill the vacancy caused by the resignation of Frank V. Burton. Eames has been active in the sales organization of the Bryant company for fifteen years.

Ernest N. Culver, who during the last three years has been division manager of the Willys-Overland Co. in charge of the southern division with headquarters at Atlanta, has been promoted assistant sales manager.

J. G. Melbrod, during the past four years foreman in direct charge of the Titanium Bronze Co. foundry, has made connections with the Hills-McCanna Co., Chicago, and assumed charge of its foundry Jan. 24.

H. M. Daniels, who has just returned from eighteen months abroad in the interest of the Four Wheel Drive Automobile Co., Clintonville, Wis., has been appointed manager of the New York branch of the company.

A. S. Hetzell has been appointed general sales manager of the Knox Tire & Rubber Co., Mt. Vernon, Ohio. Hetzell was formerly connected with the Diamond Rubber Co. and latterly with the Republic Rubber Co.

R. I. Pierce has resigned as supervisor of production and materials of the Grammer-Bernstein Motor Truck Co., effective Feb. 1. Pierce will join the sales organization of the Holland Furnace Co., Lima, Ohio.

S. Y. Tidd has been elected president of the New Tread Tire Co. of Columbiana, Ohio; C. R. Calvin, secretary and treasurer, and Eric P. Altenburg, vice-president and general manager.

Charles Froesch has resigned as chief engineer of the S. W. Merritt Co., New York, to become associated with William E. Kemp, New York, carburetion specialist.

Paul Fitzpatrick, vice-president of the General Motors Acceptance Corp., has returned from a trip abroad.

E. B. McKay has been elected vice-president and general manager of the Inland Rubber Co., Chicago.

W. C. Anderson Resigns
as Ford Representative

DETROIT, Jan. 26—Warren C. Anderson, director of the five Ford Motor Co. corporations in Europe and chief representative of the American company, with offices in London and Paris, resigned to-day. Both Edsel Ford and Henry Ford were in conference with Eastern bankers, so the resignation was not tendered personally but laid on the desk of Edsel Ford, president. No reason was given for the resignation.

Huron Truck Prepares
for Improved Business

BAD AXE, MICH., Jan. 22—The annual meeting of the directors of the Huron Truck Co. resulted in the re-election of the present officers and directors. The officers are: President, F. W. Kinde; vice-president, W. R. Lyons; secretary, C. C. Henny; treasurer, Fred M. Cross. The board of directors consists of these officers and former Governor A. E. Sleeper, George L. Whitney, John G. Clark, Fred M. Cross and John Ryan.

INDUSTRIAL NOTES

Arrow Pump Co. has been organized with headquarters at 1438 Washington Boulevard, Detroit, to manufacture a full line of small pumps for automobile, marine and tractor engines. The company is headed by F. M. Cobb, for several years president and general manager of the Fulflo Pump Co. Other officers of the same company are associated with him in the new enterprise. The capacities of the pumps to be made at present range from 4 quarts to 25 gallons a minute.

Detroit Consolidated Sales Co., Inc., has been formed in Detroit to handle the sale of Universal Tool Co. products to the wholesale trade in Minnesota, Iowa, Missouri, Arkansas, Louisiana and all states east. Officers of the company, most of whom were formerly connected with sales end of the Universal company, are E. H. Herman, president; C. H. Hinckley, vice-president; J. F. Nebrick, treasurer, and C. C. Weisblum, secretary.

General Electric Co. has bought the lamp and wire plants of the Independent Lamp & Wire Co., and it is thought the latter company will go out of business. One-third of the Independent company stock was owned by the General Motors Corp., which took about 10 per cent of its lamp output.

General Motors Corp. has bought an entire city block in Saginaw almost adjacent to the Jacox plant, which is a General Motors unit and which makes steering gears. While for the time being it is not expected that anything will be done to the new property, the site will eventually be used for the erection of a large addition to the Jacox plant.

Roller-Smith Co. has appointed the J. E. Dilworth Co., Memphis, as its representative in western Tennessee, eastern Arkansas and northern Mississippi. The electrical department of the Dilworth company is in charge of E. M. Greeson, formerly associated with Fairbanks, Morse and Sanborn Electric Co.

Seymour Laboratoried Units, Inc., has been adopted as the new corporate style of the W. E. Seymour Mfg. Co. of Milwaukee. Walter E. Seymour is head of the company which is incorporated with a capital of \$250,000 to manufacture piston rings and other automotive parts and specialties.

Service Motor Truck Co. of Wabash, Ind., has notified the Commercial Intelligence Branch of the Department of Trade and Commerce that it has purchased fifty acres of ground in London, Ont., and expects to build workshops for the manufacture of motor trucks in the spring.

Universal Tool Co., Inc., has moved its sales, service and executive offices from Detroit to the new factory at Garwood, N. J.

Ward La France Truck Corp. has established a direct factory branch in Chicago in charge of former Sales Manager G. E. De Long.

Four Drive Tractor Co., Big Rapids, Mich., has passed into the control of Dr. G. H. Lynch and John E. Bergelin.

MILES BUYS NEW BUILDINGS

CHICAGO, Jan. 21—The Miles Piston Ring Co., manufacturer of piston rings for about fifteen automobile companies, has acquired property on the South side of this city improved with a one and two story building. The Gill Piston Ring Co. has recently completed an addition to its plant here and has plans for further additions next year.

Calendar

SHOWS

- Jan. 29-Feb. 4—Chicago, National Passenger Car Show, Coliseum. Auspices of N. A. C. C.
- Jan. 31-Feb. 5—London, Ont., National Automobile Show of Western Canada, London Chamber of Commerce, Armouries, T. C. Kirby, Mgr.
- Feb. 5-12—Minneapolis, Annual Automobile Show, Minneapolis Automobile Trade Ass'n.
- Feb. 7-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.
- Feb. 7-12—St. Louis, Annual Automobile Show, St. Louis Automobile M'frs & Dealers' Ass'n, Robt. E. Lee, Mgr.
- Feb. 12-19—Hartford, Conn., Annual Automobile Show, Hartford Automobile Dealers' Ass'n, Armory, Arthur Fifoot, Mgr.
- Feb. 12-19—Kansas City, Annual Automobile Show, Kansas City Motor Car Dealers' Ass'n.
- Feb. 14-19—Winnipeg, Western Canada Automotive Equipment Show.
- Feb. 18-23—San Bernardino, Cal., National Orange Show, Fred M. Renfro, Mgr.
- Feb. 19-26—San Francisco, Fifth Annual Pacific Automobile Show, Exposition Auditorium, George Mahlgreen, Mgr.
- Feb. 21-26—Louisville, Annual Automobile Show, Louisville Automobile Dealers Ass'n, First Regiment Armory, C. L. Alderson, Sec'y.
- Feb. 21-26—Salt Lake City, Annual Automobile Show, Intermountain Automotive Trades Ass'n, W. D. Rishal, Mgr.
- Feb. 26-Mar. 5—Buffalo, Annual Automobile Show, Buffalo Automobile Dealers Ass'n, 74th Regiment Armory, C. C. Proctor, Mgr.
- Mar. 2-10—Des Moines, Annual Automobile Show, Coliseum, C. G. Van Vliet, Mgr.
- Mar. 5-12—Atlanta, Annual Automobile Show, Atlanta Automobile Dealers' Ass'n, Auditorium, Virgil Shepard, Mgr.
- Mar. 5-12—Brooklyn, Annual Automobile Show, Brooklyn Motor Vehicle Dealers' Ass'n, 23d Regiment Armory, George C. Lewis, chairman.
- Mar. 5-12—Pittsburgh, Annual Automobile Show, Automotive Ass'n, Inc., Motor Square Garden, J. J. Bell, Mgr.
- Mar. 5-12—Atlantic City, Annual Automobile Show, Automobile Trade Association of Atlantic City, Million Dollar Pier, A. H. Generatzky, Mgr.
- Mar. 7-12—Syracuse, N. Y., Annual Automobile Show, Syracuse Automobile Dealers Ass'n, Armory, Howard H. Smith, Mgr.
- Mar. 7-12—Indianapolis, Annual Automobile Show, Indianapolis Automotive Trade Ass'n, Automobile Bldg., State Fair Grounds, John Orman, Mgr.
- Mar. 12-19—Boston, Annual Automobile Show, Mechanics Bldg. and South Armory.
- Mar. 14-19—Omaha, Annual Automobile Show, Omaha Automobile Trade Ass'n, Inc., Omaha Auditorium, C. G. Powell, Mgr.
- Mar. 14-19—Washington, Annual Automobile Show, Washington Automobile Dealers' Ass'n, Rudolph Jose, Chmn.
- April 4-9—Seattle, Annual Automobile Show, Seattle Motor Car Dealers' Ass'n, Arena Hippodrome.
- April—Chattanooga, Tenn., Spring Automobile Show, Chattanooga Automotive Trade Ass'n, Sunday Tabernacle, C. A. Noone, sec'y.

FOREIGN SHOWS

- Feb. 7—Delhi, India, Delhi Motor Show.
- Mar. 23-28—Witwatersrand Agricultural Show including machinery and motors sections.
- April, 1921—Sofia, Bulgaria, Tractor Trials, under the Bulgarian Ministry of Agriculture.
- May 28-June 8—International Automobile Exhibition, Basle, Switzerland.
- June, 1921—Reykjavik, Iceland, Agricultural Exhibition—Agricultural Machinery—Icelandic Agricultural Society, Reykjavik, Iceland.
- October—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

CONVENTIONS

- Feb. 2-4—Chicago, First Annual Meeting, Automotive Electric Service Assn. Hotel La Salle.
- May 4-7—Cleveland, National Foreign Trade Council.
- Oct. 12-14, 1921—Chicago, Twenty-Eighth Annual Convention National Implement & Vehicle Ass'n.

Roads Bureau to Show Practicability of Tests

WASHINGTON, Jan. 24—For the second time in its history, the Federal Bureau of Public Roads will make an elaborate exhibit outside the National capital when it stages a demonstration of its work at the American Good Roads Congress to be held at the Coliseum in Chicago, Feb. 9 to 12 next. The bureau is preparing to ship considerable equipment to Chicago and several of the bureau officials will occupy prominent places on the program.

Features of the government exhibit will be actual demonstrations by the Division of Tests in the conduct of the impact tests that the bureau is using to determine the ability of different soils to sustain roads and to measure the amount of wear on road surfaces caused by heavy traffic. Owing to the fact that moisture in the underlying soil is the principal cause of road failures, the actual subgrade tests and investigations which will also be conducted by the bureau at Chicago, showing how the movement of water in different soils can be controlled and road failures reduced, will be a big feature. The bureau will also conduct tests of road-building materials.

OHIO DISMISSES HIGHWAY HEAD

COLUMBUS, Jan. 24—Major General George W. Goethals, builder of the Panama Canal and formerly Quartermaster-General of the Army, spent a day in Columbus conferring over the reorganization of the Ohio Highway Commission. Considerable attention is being given to the reorganization of the Ohio Highway Commission and the first step in that di-

rection was the dismissal of A. R. Taylor, highway commissioner and the naming of T. S. Brindle, chief engineer in the department, acting commissioner until the reorganization plan is decided upon.

Credit Men's Bureau Aids Car Financing

NEW YORK, Jan. 22—The Auto Financing Credit Men's Association, Inc., organized in New York a year ago to protect members and to assist dealers in improving the quality of their time payments risks, now has twenty-five members in the New York territory and seventeen in Chicago, who did \$256,597,891 of business in 1920. The association has been working quietly for the past year, maintaining a paid secretary and exchanging information regarding accounts to prevent duplication of loans on a single security. At the same time it has been sending out periodic letters to dealers who are clients of its members, giving general information about credit risks. The membership includes some of the largest acceptance corporations, including two controlled by automobile interests.

WINDSHIELD PATENT UPHELD

NEW YORK, Jan. 24—Federal Judge Hand has granted to Theodore B. Nisbet, John O. Hofbauer and Anton Valerius a perpetual injunction restraining the Perkins Tonneau Windshield Co., Inc., from the manufacture or sale of windshields embracing the claims in a patent granted to Hofbauer in 1912. The court has appointed a commissioner to assess the damages due the plaintiffs under the infringement which the court recognizes.

Congress Drops Fund for Horsepower Study

WASHINGTON, Jan. 22—Engineering research into the problems of standardization of horsepower of motor trucks and tractors, as contemplated by the Bureau of Roads in co-operation with automotive manufacturers, will be abandoned unless the Senate Appropriations Committee restores the item for \$100,000 which the House Committee struck from the Agricultural Appropriation Bill. Other reductions in the appropriations for this Federal agency will undoubtedly force them to revise their extensive plans for scientific inquiries into motive power and highways.

Truck and tractor manufacturers had requested the Bureau of Roads to undertake these investigations among farmers and other users of automotive farm equipment. The inquiry was intended to cover the construction, capacity, use and operation of farm implements, farm machinery, motor trucks, tractors and motive power for farm purposes. Only a portion of this fund would have been devoted exclusively for inquiries in this field as the research was to have been extended to other phases of rural engineering problems.

NEW YORK GETS DEVICE BILL

ALBANY, Jan. 24—Assemblyman Martin has introduced in the Legislature a bill which would require every motor vehicle to be equipped with automatic lights showing by color or other means whether it is moving or stationary. The bill would require use of words or lettering by day to show whether or not the car is in motion. It is significant the requirements fit a patented device.